

National Missile Defense--Are the Threats Commensurate with the Costs?

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## **EXECUTIVE SUMMARY**

**Title:** National Missile Defense--Are the Threats Commensurate with the Costs?

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**Thesis:** Although the threat from a ballistic missile launch against the United States is very real, other types of threats are more likely; thus, money used to develop and deploy a National Missile Defense (NMD) system would be better used to counter the other, more pressing threats.

**Discussion:** In Fiscal Year 2002, the United States spent approximately \$8 billion on missile defense research, development, and deployment of various theater and national missile defense systems. Current estimates project NMD costing over \$238 billion by 2025; yet, most intelligence experts agree that a ballistic missile launch against the United States homeland is the least likely threat event. Covert delivery of weapons of mass destruction is much more likely because other methods of attack are cheaper and easier to obtain, hide, and use. Covert methods are also more difficult to attribute to a specific state or group, making retaliation more difficult. A terrorist organization or hostile state could attack the United States homeland via cruise missiles, biological, chemical, radiological weapons, and cyber attack. Comparatively speaking, much less money is being allocated to counter these other, more likely methods of attack.

**Recommendation:** Spending for missile defense, especially NMD, should be, but currently is not, commensurate with the likelihood of attack from a ballistic missile and should not jeopardize America's ability to maintain a strong offensive military capability. Some of what is planned for NMD should be directed towards countering more likely attack methods.

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## PREFACE

When I was assigned to Headquarters Air Force Space Command at Peterson AFB, Colorado, I spent a considerable amount of time dealing with the National Missile Defense (NMD) community in my capacity as the chief of ICBM testing. The NMD program was working on the midcourse intercept experiments, and the Air Force missile flight tests provided the NMD community a great, inexpensive opportunity to test their detection and tracking equipment on actual ballistic missiles and reentry vehicles. In dealing with the NMD community, I was surprised how many different contractors and organizations were responsible for various aspects of the program.

My interaction with the NMD community made me curious about the costs involved in the NMD effort. Additionally, President Bush's increased emphasis on NMD heightened my interest. Once I began to read and comprehend the costs, I began to question whether or not a ballistic missile launch against the United States was high enough on the probability scale to warrant the cost of the program. With the retaliatory power of the United States, I personally found it beyond logic that another state would in essence commit suicide by launching a ballistic missile against the United States, knowing this type of missile leaves a launch signature telling us from where it came. Although many believe the United States is constrained in its ability to use its nuclear arsenal against an adversary, I believe the gloves would come off if another state initiated a devastating attack against a large American city. This led me to the topic for this paper. I wanted to better understand our leaders' concerns with the ballistic missile threat, and I wanted to learn more about other threats facing the country as well as our country's efforts to mitigate those risks.

Throughout the development of this paper, several people have guided me with the content and organization of the project. First of all, I would like to thank Dr. Janeen Klinger for her insight and valuable comments and for also setting me off in the right direction in the project's infancy. I would also like to acknowledge Lt Col Chuck Hudson for his guidance throughout the process as well as his much-needed help with the organization of the paper. Additionally, Dr. Don Bittner provided valuable advice on time management and discussed the project with me on several occasions. My classmate, Mark Phillips, made valuable recommendations to help improve the readability of the paper. Last, but certainly not least, I would like to thank my husband, Lt Col Mike Peel. He continually acted as my sounding board and survived many hours of debate on virtually every issue surrounding the paper. He also edited every draft and provided valuable comments throughout the process. Finally, he sacrificed several weekends and evenings of fun and adventure to stay home and help me while I worked on this project.

## **CHAPTER ONE: INTRODUCTION**

*"Some happy day in the future, when we're all elderly and retired, we'll find ourselves tucking a grandchild in for the night. Unlike our own generation when we were young, that child will be going to sleep in his bed, safe from any foreign attack -- because Congress made the decision to deploy a national missile defense."*

### **Remarks by Representative Dick Armeay**

on H.R. 4, The National Missile Defense Act

18 March 1999<sup>1</sup>

Many in the United States today may be shocked to discover America is completely defenseless against a missile attack on its soil. The United States military is the strongest, best-trained, and best-equipped in the world, but it is still unable to protect Americans from a ballistic missile attack.

On 31 August 1998, North Korea launched its first multi-stage rocket. This rocket passed over Japanese territory, causing considerable concern in the United States and Southeast Asia. The fact that the missile had a third stage caught the intelligence community off-guard and suggested North Korea was developing an intercontinental ballistic missile (ICBM) capable of reaching parts of the United States.<sup>2</sup> The Korean Taepo Dong-1 launch galvanized Congress in the National Missile Defense (NMD) debate. In response, Congress directed a special commission to assess the ballistic missile threat to the United States, resulting in the Rumsfeld Commission. The Commission determined the ballistic missile threat to the United States was greater than originally anticipated.<sup>3</sup> Because of this increased perception of threat, President Clinton signed The National Missile Defense Act of 1999, which reads:

It is the policy of the United States to deploy as soon as is technologically feasible an effective National Missile Defense system capable of defending the territory of

the United States against limited ballistic missile attack (whether accidental, unauthorized, or deliberate).<sup>4</sup>

NMD is the focus of this paper. Although missile defense efforts include theater systems designed to counter short-to-medium range missiles overseas, this paper will center on NMD. NMD systems are designed to protect the continental United States from ballistic missiles.<sup>5</sup>

This paper will briefly cover the history of ballistic missiles and past plans to defend against them. The paper will also address current and potential future threats from a ballistic missile attack on the United States. Ballistic missile threats to the homeland include an attack from nations termed rogue states as well as possible accidental launches, primarily from Russia. The paper will also explore the likelihood of other types of threats from hostile states as well as non-state actors. These threats include cruise missile, biological, chemical, and radiological attack within the United States, as well as cyber attack on information systems.

Next the paper will describe potential solutions other than NMD to the ballistic missile threat as well as to other types of threats. Some of these solutions include traditional deterrence, consequence management, nonproliferation programs, shared early warning, counterproliferation, and identification and protection of critical information systems.

Finally, this study will cover the costs and characteristics of various systems suggested for NMD and also present financial estimates for other programs designed to counter the various threats. The expenses for other high-profile military programs will also be presented. After comparing the likelihood of other threats and the financial estimates of other programs to the costs and benefits of NMD, this paper will explore whether or not current plans for NMD are fiscally sound, or whether finite defense dollars need to be directed towards countering other threats.

Although it is true the United States currently has no defenses against a ballistic missile attack on its homeland, this study will assess whether or not the risks to the United States from a ballistic missile attack warrant the cost of an NMD system.

## **CHAPTER TWO: BACKGROUND INFORMATION**

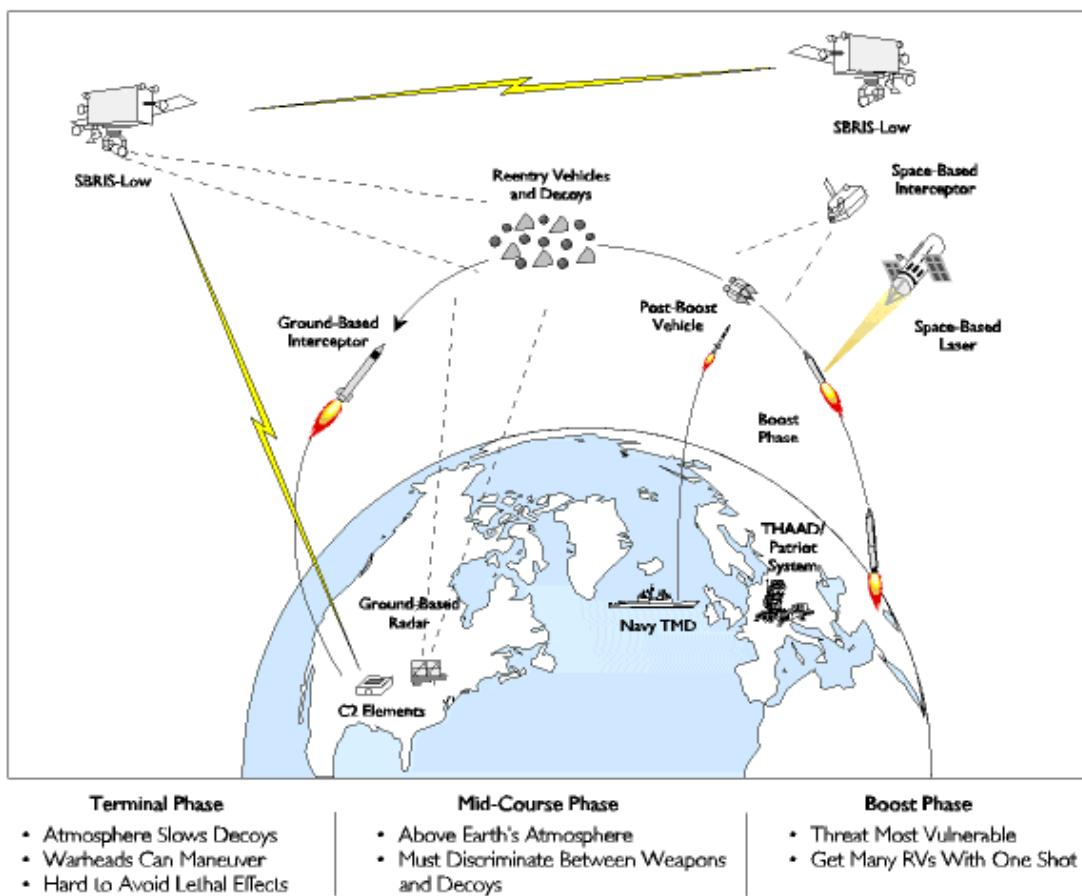
Prior to delving into NMD and the various threats facing the United States, a quick review of the history of ballistic missile development and past NMD efforts helps put the current debate into historical perspective. Missile development can be traced back to the Chinese in the 1300s. They were the first to use explosives to power missiles. Although western militaries experimented with rockets, it was not until World War II that rockets of considerable range (up to 180 miles) were developed. The Germans developed the V-1 and the world's first ballistic missile, the V-2. After the war, the United States and Soviet Union focused on developing long-range bombers and ICBMs. After the Soviet Union launched Sputnik into space with a multi-stage missile on 4 October 1957, missile programs became a priority.

Since the development of ballistic missiles, the United States has been researching ways to counter them, and NMD research, development, and debates have been evolving since World War II. In the mid-1950s, the Army worked on a ground-based system called Nike-Zeus. Nike-Zeus called for a nuclear weapon to detonate at a very high altitude, outside the earth's atmosphere (exoatmospheric), destroying an enemy's incoming weapons. Although the rocket science was feasible, the radar technology at the time was too primitive, and the radars could be deceived with enemy countermeasures like decoys or balloons. During the Kennedy Administration, Nike-Zeus evolved into the Nike-X program. Nike-X included upgraded radars, interceptors, and missiles. In 1967, President Johnson realized the United States could not protect itself from an all-out Soviet attack and changed the focus of the missile defense research. Under Johnson, the Sentinel system was designed to protect major cities from very limited nuclear missile attacks. President Nixon changed the intent of Sentinel from protecting cities to protecting military targets and renamed it Safeguard. Safeguard was developed and declared

operational at Grand Forks, North Dakota on 1 October 1975; however, the House of Representatives voted the next day to shut down the system because the Soviets were planning to put multiple independently-targeted reentry vehicles (MIRV) on their missiles, making Safeguard ineffective against a Soviet attack. Safeguard officially closed in 1978. On 23 March 1983, President Reagan presented his plan to make “nuclear weapons impotent and obsolete.” This “Star Wars” speech initiated research into a space-based system called the Strategic Defense Initiative (SDI). By 1987 many of the SDI concepts were considered technically unworkable. Under George H. W. Bush, SDI was reworked as Global Protection Against Limited Strikes or Brilliant Pebbles. Brilliant Pebbles was to be an integrated system designed to protect the United States against tactical, theater, and intercontinental ballistic missiles. When President Clinton took office, intelligence estimates indicated that Iraq had been within six months of having a nuclear weapon. In response to this report, President Clinton concentrated more on theater defenses to protect deployed troops.<sup>6</sup> Today, President George W. Bush hopes to combine ground-based systems with sea, air, and space-based components into a layered defense system designed to intercept missiles in any of their three phases of flight as illustrated in Table 1: boost, mid-course, and terminal.<sup>7</sup>

**Table 1**

## **Basic Missile Defense Elements**



Source: Defending America: A Plan to Meet the Urgent Missile Threat; The Heritage Foundation, 1999.

## **CHAPTER THREE: NATIONAL SECURITY THREAT ENVIRONMENT**

The United States faces, or will face in the future, a wide array of threats to its national security. These threats include ballistic missile launches as well as many other methods of attack. Section one of this chapter will address the ballistic missile threats, and section two will review other types of threats.

### **SECTION ONE: BALLISTIC MISSILE THREATS**

Ballistic missile threats to the continental United States within the next fifteen years are projected to come from three sources: rogue states, Russia, and China. This section will analyze the threat from each of these three. The newest and most uncertain ballistic missile threat originates from states termed rogue states.

#### **PART A: ROGUE STATES**

One of the primary arguments for NMD is based on the Rogue State Doctrine. The Rogue State Doctrine was coined by Colin Powell while he was the Chairman of the Joint Chiefs of Staff and has become a primary component of America's foreign policy. Powell's assumption was that a small number of hostile states would attempt to acquire ballistic missile technology and weapons of mass destruction (WMD). Such states would act irrationally and because of this irrational behavior would not be deterred by America's offensive capabilities. President Clinton acknowledged during a statement concerning the National Missile Defense Act of 1999, "the growing danger that rogue nations may develop and field long-range missiles capable of delivering weapons of mass destruction."<sup>8</sup> In the 2002 National Security Strategy, President Bush defined rogue states as those that "brutalize their own people, display no regard for international law, are determined to acquire weapons of mass destruction, sponsor terrorism, reject basic human values, and hate the United States." The 2002 National Security Strategy also

stated that “deterrence based only upon the threat of retaliation is less likely to work against leaders of rogue states more willing to take risks.” For rogue states, WMD are tools for intimidation against their neighbors and can be used to blackmail the United States. According to President G. W. Bush, “states also see these weapons as their best means of overcoming the conventional superiority of the United States.”<sup>9</sup>

In 1998, Donald Rumsfeld chaired a commission, directed by Congress, in response to the perceived growing missile threat. The Commission’s report stated the missile threat as being greater than anticipated with primary threats coming from North Korea, Iraq, and Iran.<sup>10</sup> The report stated one of these rogue states would be able to inflict major destruction on the United States within five years of a decision to acquire the capability. The report emphasized the threat as “broader, more mature, and evolving more rapidly than that reported by the intelligence community.” The report also stressed that there may be little or no warning of new ballistic missile development. The traditional ICBM programs of the United States and the Soviet Union took considerable investments of time and resources to ensure the safety, accuracy, reliability, and security standards inherent to those programs. Rogue states do not share the same high standards, so their programs can move more rapidly. These states can also obtain extensive assistance from foreign sources, and they are able to conceal parts of the program.<sup>11</sup> These countries are learning about America’s collection capabilities from open reporting and from each other. In response, they are increasing their security measures.<sup>12</sup> The quicker rate of development, increased foreign assistance, and greater security measures combine to reduce the warning time of a new rogue state ballistic missile program.

The 2002 National Intelligence Estimate reinforced the findings of the Rumsfeld Commission projecting that “before 2015 the United States most likely will face ICBM threats

from North Korea and Iran, and possibly from Iraq...in addition to the longstanding missile forces of Russia and China.” According to the report, America’s interests, military, and allies overseas are already significantly threatened by short- and medium-range ballistic missiles. Additionally, proliferation of missile-related technologies has enabled states to accelerate missile development. ICBMs provide states prestige, deterrence against attack, and coercive diplomacy capabilities non-missile delivery systems do not.<sup>13</sup>

Thomas Moore of the Heritage Foundation, a conservative think tank, believes rogue states will use ballistic missiles to attack, coerce, or blackmail the United States, and missile defense may convince these states to spend their scarce resources on other priorities. Mr. Moore also believes ending America’s vulnerability to coercion from rogue states will build more confidence in America’s allies. According to Mr. Moore, with an NMD system, “allies under attack need not fear that an adversary’s threat of missile strikes on the United States homeland will deter America from coming to their aid.”<sup>14</sup> The State Department’s Bureau of Arms Control stated similar sentiments in a September 2001 Fact Sheet. The Fact Sheet stated missile defense will be a force for stability and security because missile defense enhances deterrence by denying rogue states the ability to inflict mass destruction. This, in turn, may cause rogue states to place less emphasis on missiles. As a bonus, missile defenses will also be a form of insurance against accidental or unauthorized launches.<sup>15</sup>

Although the State Department and the Heritage Foundation believe missile defense will reduce allies’ fears, there is evidence the opposite is true. Europeans fear the United States will become less interested in Europe, and isolationist tendencies will increase as the United States becomes less vulnerable to missile attack.<sup>16</sup> After Secretary of Defense Rumsfeld reaffirmed America’s commitment to deploy NMD at a conference in February 2001, the dominant mood in

the European press was one of resignation, with most "convinced that Bush intends to implement his project," but also worried that doing so "risks exacerbating tensions within NATO."<sup>17</sup>

According to the 2002 National Security Strategy and the Rumsfeld Report, the threat from rogue states is greater than from other WMD-equipped states like China and Russia partially because rogue states are thought to act irrationally. Do rogue states act irrationally? Can they be deterred? Many argue that rogue states do not act irrationally. Ivan Eland and Daniel Lee of the Cato Institute believe rogue states are demonstrating rational behavior in developing missile programs, and their primary motive is not to launch a first strike against the United States. Not surprisingly, rogue states view ballistic missiles as cost-effective weapons to be used as coercive tools for diplomacy and to obtain prestige to be used for regional politics. Accordingly, regional politics drive their ballistic missile development programs. For example, Iran and Iraq's programs have historically been directed at each other. North Korea's medium-range missiles are designed to reach adversaries in their region such as South Korea and Japan; however, their medium and short-range missiles do pose a threat to American forces in the region. According to the 1999 National Intelligence Estimate, "if U. S. forces were less likely to use force near their borders or from afar, these nations would have less incentive to develop long-range missiles."<sup>18</sup> In other words, if the United States was not using its influence near these rogue states' borders, these states would have no incentive to develop long-range ICBMs. Rogues correctly see the United States as their major barrier to achieving their strategic goals, so although such states are hostile, they are not irrational.<sup>19</sup>

There have also been recent positive developments concerning rogue states, calling their irrationality into question. In 1999, the United States lifted some sanctions against North Korea in exchange for a suspension on missile testing.<sup>20</sup> In 2000, North Korea also initiated a summit

between North Korea and South Korea aimed at improving relations.<sup>21</sup> In 2001, Kim Chong-il extended the suspension on missile testing until 2003, provided negotiations with the United States continued.<sup>22</sup> Even North Korea's recent revelation of a nuclear weapons program, in clear violation of a 1994 agreement with the United States, does not indicate irrational behavior when one considers the potential leverage and prestige North Korea gains from being a nuclear power within its region.<sup>23</sup> Despite the arguments to the contrary, if North Korea truly is hostile and irrational, it is questionable how serious a threat the country is to the United States.

North Korea's war-making potential remains limited because it suffers from a weak economy. For example, in 1999, it spent only \$2 billion in military expenditures.

There have also been positive developments in Iran. In 1997, Iranians elected reformist President Mohammed Khatemi who has moderated some of his country's radical behavior. Khatemi sent military and political delegations to neighbors in the Persian Gulf and has expanded relations with many nations. Additionally, Iran would need significant increases in its defense expenditures to build missiles with intercontinental range. Finally, Iranian defense policy remains focused regionally; therefore, the United States should not view its missile program as a serious threat to the homeland.<sup>24</sup> As with North Korea, when Iran's actions are viewed from a regional perspective, its behavior appears motivated by the political environment of its region; therefore, Iran's behavior is not irrational.

Iraq is another state hostile to the United States and labeled a rogue; however, Joseph Cirincione from the Carnegie Endowment for International Peace believes Iraq's missile development programs have been largely shut down because Iraq is constrained by United Nations' sanctions and prohibitions. Because of the sanctions, it would take years for Iraq to reconstruct its former programs.<sup>25</sup> Eland and Lee also believe Iraq is "the least capable of

developing long-range missiles that could hit the United States.” Wars and sanctions have hurt Iraq’s economy. To illustrate, in 1998 Iraq’s gross domestic product was \$19 billion, and defense expenditures totaled a meager \$1.4 billion.

Per Eland and Lee, “even if hard-liners prevail in all those nations [rogue states] and have hostile intent toward the United States, they are ruthless - rather than irrational - and probably deterable in most cases by the powerful American offensive nuclear arsenal.”<sup>26</sup>

Robert Walpole, a CIA National Intelligence Officer expressed similar sentiments when he said, “North Korea, Iran, and Iraq are probably pursuing missile programs because they view them as a strategic tool of deterrence, coercive diplomacy, and not as operational weapons of war.”

According to Colonel Daniel Smith, USA (Ret), from the Center for Defense Information, “this would suggest these leaders are not irrational rogues bent on an unprovoked attack on the United States. They are just as susceptible, through persistent, hard diplomacy, to the influence of the community of states as are other nations.”<sup>27</sup>

Cirincione also argues that the Rumsfeld Commission and the 1999 National Intelligence reports assess the missile threat solely on technical capabilities. There was a radical shift in the National Intelligence Estimate from 1995 to 1999. Authors of the 1999 report shifted criteria from what was probable to what was possible. This shift in criteria could have led some to conclude there had been significant technological advances in third world missile development programs when in actuality, there had only been incremental development. Also of note, the 1999 National Intelligence Estimate did not include political estimates.<sup>28</sup> The National Intelligence Estimate’s traditional approach was to base their analysis on what was likely to happen rather than what could happen. The Rumsfeld Commission Report was based on a worst case scenario of what was imaginable instead of what was likely. According to Colonel Smith,

“although policy needs to consider possibilities, in a world of constrained resources in which hard choices must be made, the sensible course is to focus on probabilities.”<sup>29</sup>

## PART B: RUSSIA

In addition to the rogue state threat, the Rumsfeld Commission Report addressed the missile threat from Russia. According to the report, governmental instability in Russia created early warning and command and control weaknesses that pose a risk of unauthorized or inadvertent launch. Russia is also a threat because they provide missile technologies to hostile countries.<sup>30</sup> Russia’s accountability for their nuclear material is likewise a concern. Although Russia owns ninety-five percent of the nuclear materials outside the United States, their poor accounting system cannot control their stockpile.<sup>31</sup> A member of the Rumsfeld Commission, Dr. Bruce Blair, stated “it is not unreasonable to anticipate a serious, even catastrophic failure of Russian nuclear control.” The CIA reported that ICBM unlock codes may be widely distributed to alternate command centers, and submarine crews may possess the capability to launch missiles autonomously.

Ominously, a breakdown in the Russian early warning system increases the risk of an unauthorized, accidental, or inadvertent launch. According to Dr. Blair, only three of the nine early warning radars work, and the Russians lack satellite coverage of the oceans.<sup>32</sup> Also, only two to four of their nine highly-elliptical warning satellites are operational today. Furthermore, the Russians are blind to possible launches at least seven hours per day.<sup>33</sup> The Russian command and control system is past due for modernization with some components ten or more years past their design life. Poor early warning and command and control capabilities reduce the decision-making timeline. Consequently, the outdated equipment produces a greater risk for inadvertent or accidental launch.

Russia also has human and organizational problems. Their forces receive less training, adhere less to safety rules, suffer from poor working and housing conditions, and are subject to food shortages. These conditions facilitate instability and could cause desperate lower-level commanders to take unauthorized control of nuclear weapons without consent from central authority.

In addition to human and organizational problems, the economic and budgetary problems in Russia have reduced Russia's ability to survive an initial attack by an enemy because Russia cannot afford to deploy survivable systems. Due to a lack of funds, nuclear armed submarines and mobile ICBMs stay in port or in garrison, rendering each system static, easily targeted, and less survivable. As a result, Russia has a use or lose mentality because she knows she must get her nuclear missiles launched prior to the impact of the enemy's missiles. In turn, this shortens the detection to decision timeline for Russian leadership. For example, in response to a launch from a submarine off Russia's coast, the nuclear release procedures require a timeline of less than fifteen minutes from detection of an incoming enemy missile to lift-off of Russian missiles. The Russian President must decide within ten minutes of detection whether or not to retaliate. The rushed nature from warning to decision could result in catastrophic mistakes. The erosion of Russia's ability to distinguish between peaceful ventures into space and a true attack further compounds the problem.

A close call happened in January 1995, which illustrates the dangers of tight time constraints and eroded early warning capabilities. Russian radars detected and tracked a missile fired near the coast of Norway. Russia interpreted it as a possible attack from an enemy submarine. The command and control system started the countdown to a launch decision for the

first time in Russian history. Eight minutes elapsed before they determined it was an American scientific rocket launched from an island off the coast of Norway and posed no threat.<sup>34</sup>

Although budgetary problems in Russia have resulted in a degradation of Russia's early warning and command and control capabilities, the 2002 National Intelligence Estimate stated that "in the current day-to-day operational environment--with all procedural and technical safeguards in place--an unauthorized or accidental launch of a Russian strategic missile is highly unlikely."<sup>35</sup>

## **PART C: CHINA**

China is another missile and nuclear power of concern to the United States. Other than Russia, China is the only other nation currently capable of attacking the United States with long-range ballistic missiles armed with nuclear warheads.<sup>36</sup> Some analysts believe China plans for as many as 200 ICBMs and submarine launched ballistic missiles (SLBMs) this decade.<sup>37</sup> The latest National Intelligence Estimate reinforces this assertion. Furthermore, the estimate maintained that "Chinese ballistic missile forces will increase several-fold by 2015."<sup>38</sup> The United States is also concerned with China's modernization program. The next generation of nuclear weapons will be more mobile, accurate, and reliable.<sup>39</sup> For example, China's modernization efforts include the application of Global Positioning System receivers to enhance the accuracy on the guidance system of its shorter-range missiles and pursuit of MIRV technology for use on its ICBMs.<sup>40</sup> Finally, China has been a proliferator of missile and WMD technology.<sup>41</sup> For example, China reportedly sold between 36 and 60 operational CSS-2 medium-range ballistic missiles to Saudi Arabia in 1987.<sup>42</sup> Additionally, in January 2003, the Director of Central Intelligence reported that throughout the 1990s and as late as 2001, Chinese companies provided nuclear and missile technology to Pakistan, Iran, North Korea, and Libya.<sup>43</sup>

According to the Rumsfeld Commission, China remains a problem because the potential for conflict with the United States still exists.<sup>44</sup> The possibility for conflict exists because of concerns over Taiwan's move toward independence, the strengthening of the United States-Japanese alliance, and the belief that the United States is a global hegemonic power.<sup>45</sup> China views Taiwan as Chinese territory and is sensitive to others infringing upon its sovereignty through alliances and cooperation with Taiwan. China also believes the sale of weapons to Taiwan is a threat to China's security and stability.<sup>46</sup> To depict China's strong commitment to Taiwan, in 1996 a spokesman for China, Lt Gen Xiong Guang Kai, questioned America's willingness to trade Los Angeles for Taipei.<sup>47</sup>

Due in large part to the historical antagonism between the Chinese and Japanese, China views Japan as unpredictable and is also distrustful of the United States - Japanese alliance. In addition to a general suspicion of Japan, China specifically believes the joint research between the United States and Japan in support of theater missile defense is moving Japan from a passive to a more active defense role that would threaten China's security.

Finally, China believes the United States wants to link its bilateral alliances into a multi-national anti-Chinese alliance in a move towards American hegemonic power, resulting in unilateral action on the part of the United States. According to the Chinese, the end result will be a United States that is less predictable.<sup>48</sup>

Although China maintains ballistic missile technology that can threaten the United States and may view the United States as a threat, its nuclear posture has historically been defensive in nature. China's nuclear development in the late 1960s was to counteract threats from the United States and Soviet Union.<sup>49</sup> Thus, China maintained a small nuclear arsenal purely for meeting its self-defense needs. Demonstrating China's defensive posture, the Chinese government clearly

stated a no-first-use principle.<sup>50</sup> In fact, China keeps its missiles unfueled, and the warheads are not mated.<sup>51</sup> Furthermore, China's 1998 "White Paper" on National Defense stated, "we will not attack unless we are attacked; if we are attacked, we will certainly counter-attack." This statement suggests the Chinese see nuclear weapons as a tool for deterrence, not aggression.

Finally, China has also vowed not to threaten the use of nuclear weapons on non-nuclear states.<sup>52</sup>

Loren B. Thompson of the Alexis de Tocqueville Institution found it remarkable Beijing had shown so much constraint in its nuclear programs, considering the potential leverage and power they have gained from them.<sup>53</sup>

Unfortunately, many believe America's deployment of an NMD system will encourage China to increase its nuclear arsenal and expedite its modernization efforts. Although NMD is defensive in nature, China views NMD as an offensive system, not a defensive one. In China's view, NMD allows the protection of American offensive capability, making it easier for the United States to attack others without fear of retaliation.<sup>54</sup> To depict China's objections to NMD, one of the five points China proposed at the 51<sup>st</sup> Session of the United Nations' General Assembly in 1996 was that "no state should develop or deploy outer space weapons or missile defenses, which harm strategic security and stability."<sup>55</sup> China also believes NMD or theater missile defenses will undermine its deterrent capabilities against the United States and Japan.

Sha Zhukang, Director General of the Department of Arms Control and Disarmament of the Ministry of Foreign Affairs stated that NMD "constitutes a direct threat to the effectiveness of China's existing limited nuclear force."<sup>56</sup> In response to NMD, China is not likely to give up its nuclear deterrent capabilities and will probably build enough missiles to overwhelm America's defenses.<sup>57</sup>

As the United States deploys NMD, some argue China may shift her doctrine from minimum deterrence to limited deterrence. “Limited deterrence” is the capability to deter conventional and nuclear war, and to control escalation if deterrence fails. Limited deterrence would require China targeting nuclear forces as well as cities, which in turn would require larger, more modernized nuclear forces.<sup>58</sup>

Another negative impact of a Chinese buildup of nuclear capability in response to NMD would be a degradation of security and stability in South Asia. Historically, India has viewed China as a threat. As a result of any Chinese nuclear build-up, India may react by enhancing her own nuclear capabilities. In turn, a build-up of India’s nuclear capability could prompt similar action from Pakistan.<sup>59</sup>

Lastly, although China has been a known proliferator of WMD and missile technology, China has taken significant, positive steps lately. The Chinese government strengthened export controls of chemical weapons related exports and stopped assistance to Pakistan’s nuclear program.<sup>60</sup> To demonstrate her resolve to control proliferation, China has been participating in several arms control agreements, such as the Treaty on the Non-Proliferation of Nuclear Weapons, the Comprehensive Test Ban Treaty, and the Chemical Weapons Convention.<sup>61</sup> Unfortunately NMD could backfire for the United States by reversing these trends and result in Chinese nullification of some, if not all, of these agreements.<sup>62</sup>

## **SECTION TWO: OTHER THREATS**

There is no doubt a hostile nuclear state could choose to threaten the United States with a ballistic missile launch; yet, there are many other capabilities and modes of attack which are less expensive and more quickly available to an enemy. The Nuclear Nonproliferation Treaty and the Missile Technology Control Regime have made ballistic programs expensive and difficult to

acquire, but less expensive options are readily accessible. This section describes several other methods of attack an enemy may choose to use against the United States, specifically cruise missiles, biological, chemical, and radiological weapons, and cyber attack.

There are many reasons a weak state or non-state actor is attracted to covert attacks.

According to the 2002 National Intelligence Estimate:

The Intelligence Community judges that United States territory is more likely to be attacked with WMD using non-missile means, primarily because such means:

- Are less expensive.
- Can be covertly developed and employed; the source could be masked in an attempt to evade retaliation.
- Probably would be more reliable than ICBMs.
- Probably would be much more accurate than emerging ICBMs over the next 15 years.
- Probably would be more effective for disseminating biological warfare agents than a ballistic missile.
- Would avoid missile defenses.<sup>63</sup>

There are many delivery methods an enemy could use to unleash crippling attacks on the country's infrastructure and economy. For example, a hostile group could detonate a weapon upon arrival at one of the country's major ports, causing a devastating impact to the global trade system. Plus, depending on the weapon, collateral damage to the city surrounding the harbor could prevent physical access into and out of the port. All trade partners would be immediately affected because American harbors would be closed for an unknown period of time. To paint a picture of America's vulnerability to this type of attack, five major bridges and one tunnel account for seventy percent of all trade between the United States and Canada. Attacking one or all of these trade routes could dramatically impact the economy.<sup>64</sup> An enemy may choose to attack America via cruise missiles, covert delivery of WMD, or a crippling cyber attack. A terrorist could deliver WMD by using a suitcase bomb to detonate a radiological weapon in a major city, or an enemy could spray a chemical nerve agent over a sports stadium. A terrorist

could also infect air travelers with a biological pathogen or virus.<sup>65</sup> Food, agriculture, and water treatment plants are also inviting targets of a biological attack. In addition to inflicting fear among the population, this type of attack could be devastating to the economy.<sup>66</sup> Even the most elaborate, multi-layered NMD system would not provide any protection against these threats.

### **PART A: CRUISE MISSILES**

A ballistic missile launch leaves a signature telling the United States from where it came. An enemy hoping to avoid the instant retaliation that would result from a ballistic missile launch against the United States would be attracted to a land-attack cruise missile. Compared to ballistic missiles, cruise missiles are more accurate, less expensive, harder to detect, and harder to defend against. They are smaller in size, have lower launch signatures, and more easily evade radar than ballistic missiles. Unlike ballistic missiles, locating the source of a cruise missile launch can be difficult because the missiles are maneuverable. For example, some cruise missiles hug the terrain making them difficult for radars to detect. Complicating detection is the fact that it is so hard to differentiate a cruise missile from a manned civilian aircraft.<sup>67</sup> Because cruise missiles do not reenter the atmosphere, they are ideal for biological and chemical weapons that may not be able to withstand the high temperatures associated with reentry.<sup>68</sup> Cruise missiles fit into shipping containers and can be delivered from a variety of launch platforms. Ominously, an enemy could easily have cruise missiles delivered to American ports. According to the 2002 National Intelligence Estimate, “the most plausible alternative for a forward-based [cruise missile] launch would be a covertly equipped commercial vessel.” Cruise missiles could also be launched from fighter, bomber, and commercial aircraft.<sup>69</sup>

Other than being able to avoid detection, cruise missiles are also relatively easy to obtain. There are over 80,000 cruise missiles deployed to over 80 countries. Eighteen countries

manufacture them, and sixty-two countries import them.<sup>70</sup> Some engineers project that a rogue state could acquire a land attack system with a 1,000 kilometer range for between \$250,000 and \$350,000, and the infrastructure for cruise missiles is widely available. According to the Defense Threat Reduction Agency, cruise missiles “pose perhaps the gravest delivery system proliferation threat.”<sup>71</sup> The 2002 National Intelligence Estimate also stated that many countries would see cruise missiles as a better alternative to ballistic missiles.<sup>72</sup>

## **PART B: BIOLOGICAL WEAPONS**

For many of the same reasons cruise missiles are attractive to an enemy, biological and chemical weapons may also be appealing attack options to a weak state or non-state actor. Biological agents are cheap and easy to obtain, and they are much more potent than the most lethal chemical weapon. Even small amounts can be devastating in their psychological impact because they are especially effective at instilling fear and panic among the population. Likewise, a biological weapon attack can take place covertly because of a delayed incubation period, allowing contamination to occur before anyone realizes it. A biological attack might even be mistaken for a naturally occurring outbreak, making retaliation unlikely.<sup>73</sup> Table 2 describes the various types of biological agents.

Because of the advantages of biological weapons, a number of countries have been working on programs over the last two decades, and there is intense concern about the possibility of proliferation due to the hiring of exiled Russian scientists. There is also an increasing concern over the possibility of terrorists using biological agents. On several occasions, the group responsible for the 1995 sarin nerve agent attack in the Tokyo subway had previously attempted to release botulinum toxins and anthrax.<sup>74</sup>

Other than the exchange of scientists and materials from one country or group to another, developments in legitimate biotechnology make proliferation harder to detect and prevent. For example, a United States government team was able to produce a biological agent without detection at a cost of \$1.6 million.<sup>75</sup>

Although a biological agent itself could be extremely effective for attacking the United States, there are technical hurdles to overcome in their delivery and weaponization. Most biological agents degrade rapidly, are unpredictable, and are susceptible to the external environment. Ballistic missile payloads reentering the atmosphere must endure reentry stresses such as high heat and high gravitational forces, making a ballistic missile delivery less than ideal. Additionally when delivered ballistically, it is technically challenging to ensure the biological agent is dispersed at the right altitude. As noted earlier, an adversary could overcome some of the technical challenges of weapons delivery by using cruise missiles, and a cruise missile would not be susceptible to intercept by an NMD system.<sup>76</sup>

**Table 2**

Biological Agents				
AGENT	INCUBATION	LETHALITY	PERSISTENCE	DISSEMINATION
<b>Bacteria</b>				
Anthrax	1–5 Days	3–5 days fatal	Very stable	Aerosol
Cholera	12 hours–6 days	Low with treatment High without treatment	Unstable Stable in saltwater	Aerosol Sabotage of water
Plague	1–3 days	1–6 days fatal	Extremely stable	Aerosol
Tularemia	1–10 days	2 weeks moderate	Very stable	Aerosol
Q fever	14–26 days	Weeks?	Stable	Aerosol Sabotage
<b>Viruses</b>				
Smallpox	10–12 days	High	Very stable	Aerosol
Venezuelan Equine Encephalitis	1–6 days	Low	Unstable	Aerosol Vectors
Ebola	4–6 days	7–16 days fatal	Unstable	Aerosol Direct contact
<b>Biological Toxins</b>				
Botulinum toxins	Hours to days	High without treatment	Stable	Aerosol Sabotage
Staphylococcal enterotoxin B	1–6 days	Low	Stable	Aerosol Sabotage
Ricin	Hours to days	10–12 days fatal	Stable	Aerosol Sabotage
Trichothecene mycotoxins (T2)	2–4 hours	Moderate	Extremely stable	Aerosol Sabotage

Source: Biological and Chemical Agent Quick Reference Tables, reviewed 12 March 2002, URL: <[http://hld.sbccom.army.mil/ip/bca\\_qr.htm](http://hld.sbccom.army.mil/ip/bca_qr.htm)>

## PART C: CHEMICAL WEAPONS

Similar to biological weapons, a chemical weapon attack is another form of WMD of concern to the United States. Chemical agents come in many different forms and attack the human body via a variety of means. For example, vesicants such as sulphur, mustard, and lewisite burn and blister the skin, eyes, and respiratory tract. Phosgene and chlorine are choking agents that also irritate the eyes and respiratory tract. Blood agents like hydrogen cyanide starve tissues of oxygen, and nerve agents such as sarin and VX interfere with the transmission of nerve impulses, causing respiratory paralysis.<sup>77</sup> Table 3 provides a description of the different types of

chemical agents. Like biological agents, chemical agents are easy to obtain. A professor at Rice University ordered the necessary chemical materials from his supply company to kill several thousand people. He was able to acquire these materials for paltry \$130.<sup>78</sup>

Although it may be easy to buy chemical agents, finding an effective means of delivery is a larger problem similar to that of biological agents. A warhead delivered ballistically must be relatively stable to hit its target. Liquid chemical agents moving inside the reentry vehicle will cause the warhead to wobble and veer off course. Additionally, various agents must be dispersed in different concentrations to be effective, and they are extremely dependent on atmospheric conditions, terrain, temperature, and weather. Ultimately, it takes large amounts of chemical agents to be highly lethal, and most agents degrade rapidly. For these reasons, as with biological agents, a ballistic missile would not be the most effective means of delivery. A cruise missile with spray tanks attached would be much better suited for the delivery of a chemical weapon.<sup>79</sup>

**Table 3**

Chemical Agents			
AGENT	SIGNS AND SYMPTOMS	DECONTAMINATION	PERSISTENCE
<b>Nerve Agents</b>			
Tabun (GA)	Salivation	Remove contaminated clothing	1–2 days if heavy concentration
Sarin (GB)	Lacrimation	Flush with a soap and water solution for patients	1–2 days will evaporate with water
Soman (GD)	Urination		Moderate, 1–2 days
V Agents (VX)	Defecation Gastric disturbances Emesis	Flush with large amounts of a 5% bleach and water solution for objects	High, 1 week if heavy concentration As volatile as motor oil
<b>Vesicants (Blister Agents)</b>			
Sulfur Mustard (H)	Acts first as a cell irritant, then as a cell poison. Conjunctivitis, reddened skin, blisters, nasal irritation, inflammation of throat and lungs.	Remove contaminated clothing Flush with soap and water solution for patients. Flush with large amounts of a 5% bleach and water solution for objects	Very high, days to weeks
Distilled Mustard (HD)			
Nitrogen Mustard (HN 1,3)			
Mustargen (HN2)			Moderate
Lewisite (L)	Immediate pain with blisters later.		Days, rapid hydrolysis with humidity
Phosgene Oxime (CX)	Immediate pain with blisters later—necrosis equivalent to second and third degree burns		Low, 2 hours in soil
<b>Chemical Asphyxiants (Blood agents)</b>			
Hydrogen Cyanide (AC)	Cherry red skin or ~ 30% cyanosis. Patients may appear to be gasping for air. Seizures prior to death. Effect is similar to asphyxiation, but is more sudden.	Remove contaminated clothing. Flush with a soap and water solution for patients. Flush with large amounts of 5% bleach and water solution for objects.	Extremely volatile, 1-2 days Rapidly evaporates and disperses Low
Cyanogen Chloride (CK)			
Arsine (SA)			

Source: Biological and Chemical Agent Quick Reference Tables, reviewed 12 March 2002, URL: <[http://hld.sbccom.army.mil/ip/bca\\_qr.htm](http://hld.sbccom.army.mil/ip/bca_qr.htm)>

## PART D: RADIOLOGICAL WEAPONS

Instead of developing an actual nuclear weapon, weak countries or non-state actors could find creative ways to use nuclear materials against the United States. For example, a radiological weapon designed to kill through radiation as opposed to a blast could be made from fission products from civilian nuclear reactors or from artificially produced material. Although these weapons would not have the blast of a nuclear weapon, they could be used offensively to create

chaos or cause mass evacuations. Unlike biological and chemical weapons, a radiological weapon could be delivered ballistically, via cruise missiles, container, aircraft, or even released in an aerosol or liquid form.<sup>80</sup> Unlike the cost for acquiring an actual nuclear weapon, the United States government estimated a terrorist group could obtain the necessary materials and talent to develop a radiological weapon for less than \$1 million.<sup>81</sup>

#### **PART E: CYBER ATTACK**

Albeit not inherently military in nature, cyber attack is another type of assault that would be appealing to weaker states and non-state actors. Although a cyber attack would not result in significant loss of life, the results could be catastrophic to the United States. An enemy could exploit the country's heavy reliance on information systems with the most likely targets being banking and financial institutions, voice communications systems, electrical infrastructures, water resources, and oil and gas infrastructures. The greatest concern is a malicious attack from someone on the inside of a major corporation or military organization because an individual with extensive system knowledge and uncontrolled access could do a considerable amount of harm. Although even a single attack could be very destructive and costly, a compound, coordinated attack could have a truly devastating impact on the United States.<sup>82</sup>

Current trends illustrate the likelihood of this type of attack. There has been a sharp increase in the number of cyber attacks in recent years. For instance, The Computer Emergency Response Institute at Carnegie Mellon University stated there were 1,334 reported attacks in 1993. In 2000, that number jumped to 21,756, and in 2002, there were 82,094 reported attacks.<sup>83</sup> The economic impacts from computer crimes thus far have been significant with estimated losses of over \$1.6 trillion. The recent Melissa and Lovebug viruses alone resulted in losses of over \$1 billion.

Although most of the reported attacks are from pranksters and activists, the most serious national security concern is from state-sponsored and terrorist efforts. For example, in 1999 intrusions originating from Moscow attempted to gain information on American readiness levels.<sup>84</sup> More recently, probes into utility management systems and government offices were traced to browsers from the Middle East and South Asia, and al Qaeda computers were found with data on remote-control systems such as those used for dam floodgates. Additionally, the Federal Bureau of Investigation (FBI) discovered “multiple casings of sites” in the San Francisco Bay area of emergency telephone systems, gas facilities, electrical generating plants, water storage facilities, and nuclear power plants, raising concerns of a terrorist plot to attack these facilities.<sup>85</sup> Obviously, cyber attack as a method of assaulting an adversary is being explored. Currently over 30 countries are developing information warfare capabilities, and both Russia and China have shown interest in cyber attack programs.<sup>86</sup>

## **CHAPTER FOUR: COUNTERING THE THREATS**

Without doubt the United States faces a profusion of threats, but how can the United States counter the variety of threats facing it? Deterrence has been the backbone of America's strategy for years and remains the core strategy to prevent a hostile state or group from attacking the United States. Although deterrence is a valid strategy, it may not be possible to deter all covert attacks, so consequence management requires greater attention. In addition to deterrence, nonproliferation has likewise been key to the country's efforts to reduce the spread of WMD and missile technology. In recent years, the United States has vigorously engaged in nonproliferation and threat reduction efforts in the former Soviet Union and has also considered sharing early warning data to reduce the risk of an accidental or unauthorized launch. Protecting the United States from attack on its soil also involves extensive import and export controls as well as enhanced security and intelligence collection. Finally, identification and protection of critical information systems are also critical aspects of countering a cyber attack.

### **SECTION ONE: DETERRENCE AND ARMS CONTROL**

The primary strategy to counter attacks against the United States has been and still is deterrence. Deterrence can work, but for deterrence to succeed, the United States must have the capability and will to retaliate against an enemy by holding what that enemy holds valuable at risk.<sup>87</sup> Additional pillars of deterrence are a rational cost-benefit calculation on both sides, mutual understanding, effective communication and positive control of forces. Rationality only means that one party is able and willing to weigh perceived costs against perceived gains and then choose a course of action related to the objective and the cost-benefit ratio.<sup>88</sup> Key to effective communication is an understanding of the culture, region, and ideology of the adversary.<sup>89</sup>

Deterrent strategies have been at the forefront of American policy ever since the United States and Soviet Union both became nuclear powers. At that time, the results of war between the two countries seemed too horrifying, and both countries began building weapons designed primarily to deter an attack. In 1954, Secretary of State, John Foster Dulles, described a deterrence strategy that would come to be known as Massive Retaliation. Dulles stated that the United States intended to deter aggression by depending “primarily upon a capacity to retaliate, instantly, by means and at places of our own choosing.” This strategy remained valid only while the United States enjoyed significantly greater nuclear capability than the Soviet Union.<sup>90</sup> As the Soviet Union and United States achieved parity of nuclear forces, America’s strategy changed to Mutually Assured Destruction (MAD). MAD was defined as:

the ability to deter deliberate nuclear attack upon the United States or its allies by maintaining at all times a clear and unmistakable ability to inflict an unacceptable degree of damage upon any aggressor, or combination of aggressors - even absorbing a surprise first attack.<sup>91</sup>

Although there have been many critics of massive retaliation and MAD, the deterrent strategies worked. Despite being ideologically opposed and clearly enemies for nearly forty years, war never broke out between the United States and Soviet Union.

More recently, the Gulf War helps illustrate the legitimacy of deterrence strategy. During the war, Iraq filled bombs and SCUD warheads with both biological and chemical agents but did not use them. The Iraqi leadership revealed in 1995 that their restraint was due to warnings that Iraq would suffer catastrophic consequences if WMD was used.<sup>92</sup> Today, America’s conventional forces are so technologically superior, that one could argue their deterrence value is higher than at any time in history.<sup>93</sup> With the country’s conventional and nuclear superiority over any potential adversary, Massive Retaliation would again seem to be a valid deterrent strategy.

Tied to deterrence is arms control. Arms control efforts have also been extremely effective at reducing the threat to the United States. According to Joseph Cirincione, “the threat they [ballistic missiles with nuclear warheads] pose now is less than in the past and is steadily declining.” Over the past fifteen years, Russia has cut the number of weapons capable of attacking the United States by fifty-seven percent, and the cuts are projected to continue.<sup>94</sup> Threats of an accidental or unauthorized launch could also be reduced by “de-alerting” the missile forces. De-alerting would reduce the chance of an accidental or unauthorized launch by increasing the amount of time required to prepare the missiles for launch, thereby increasing the decision-making time cycle.<sup>95</sup>

Although deterrence is clearly a valid strategy for dealing with state actors, for deterrence to work with non-state actors, the United States would need to be able to attribute an action to a specific group and then be able to locate that group for retaliation. For terrorists, the deterrent strategy would need to be proactive and include disruption of their activities, intrusion on their plans with preemptive strikes, inclusion of inspections and arrests, and restrictions on freedom of their movement.<sup>96</sup> With covert terrorist attacks, the emphasis would have to be on an efficient and effective response to terrorism in order to create a climate unfavorable to the terrorists. This then would create an expectation of futility and would ultimately strengthen deterrence against future terrorist attacks. Key to deterrence against terrorism is consequence management.<sup>97</sup>

## **SECTION TWO: CONSEQUENCE MANAGEMENT**

Effective consequence management is tied to deterrence in that limiting the impacts of a terrorist attack may reduce the incentive for similar attacks in the future. Enhanced consequence management requires an increase in domestic readiness by developing well-organized response plans to manage the effects of an attack and reduce the panic and disruption associated with an

attack.<sup>98</sup> The United States is already taking steps to improve crisis response capabilities, but much needs to be done. Recently Gary Hart and Warren B. Rudman co-chaired an independent task force to look into America's preparedness for another terrorist attack. In their report, they provided many recommendations, one of which was to bolster the National Guard's capacity to respond to domestic, urban attacks. Currently the National Guard is equipped to support conventional combat units, but it needs to acquire protection, detection, and other equipment and special training to provide civil support after a large-scale attack.<sup>99</sup> Another recommendation from the report was to make first responders ready to respond by providing federal funds for the gear and training required. Currently state and local governments do not have the funds necessary to respond to a large-scale attack. For example, at the United States Conference of Mayors, seventy-nine percent of mayors reported shortfalls for threat detection equipment, seventy-seven percent for emergency response equipment, and sixty-nine percent for personal protective apparel. Additionally, cities lack an interoperable communications system to support police, fire, county, state, regional, and federal response personnel<sup>100</sup>

The Hart-Rudman report also recommended changing the priorities for transportation security since vulnerabilities are currently greater and the stakes higher in sea and land modes of transportation as opposed to commercial aviation. For instance, a large-scale attack at one of the largest ports would be much more devastating than an attack using a commercial aircraft; yet, the preponderance of security is in the commercial aviation sector. The federal government should also fund energy distribution vulnerability assessments as soon as possible and then stockpile backup components, so operations could be quickly restored if an energy grid was attacked. Local, state, and federal public health and agricultural agencies also need a greater capacity for detecting and conducting disease outbreak investigations. Ultimately, many of the legal

roadblocks to greater public-private cooperation need to be removed to include implementing liability safeguards and limits to ensure more information sharing between private and federal agencies.<sup>101</sup>

Although aggressive consequence management would be expensive, some of the costs would be offset by benefits. Enhanced detection and interception tools would improve law enforcement's ability to combat illegal activities to include narcotics smuggling. Tools used to save lives after an attack could also be used for accidents and natural disasters.<sup>102</sup> Tied to deterrence, consequence management is a key strategy for dealing with terrorist attacks because being prepared at home is critical to reducing terrorism's appeal as an effective means of warfare.<sup>103</sup>

### **SECTION THREE: NONPROLIFERATION AND THREAT REDUCTION**

Nonproliferation and threat reduction programs are two other strategies to prevent the spread of WMD. Nonproliferation is designed to limit or prevent the acquisition of missile technology and WMD primarily via diplomatic, political, and economic means.<sup>104</sup> Bound to nonproliferation, threat reduction programs fight proliferation by destroying nuclear, chemical, and biological weapons and their associated infrastructure. Both nonproliferation and threat reduction establish safeguards against proliferation.

Similar to deterrence, nonproliferation has been at the heart of America's defensive strategy. Overall, the Nuclear Nonproliferation Treaty and the Missile Technology Control Regime have been successful at raising the costs for states who want to acquire WMD and missile technology and have made it more difficult for non-state actors to play in the WMD and missile game. Although the Nuclear Nonproliferation Treaty and the Missile Technology Control Regime have helped to slow the spread of WMD, Western governments have only half-

heartedly enforced compliance. For economic and political reasons, the United States has ignored violations by Russia, China, Israel, and other third world states, leading to double standards in enforcement. Under United States law, the President must suspend aid to a country that transfers nuclear technology to nuclear programs without international safeguards. To illustrate this double standard, George W. Bush has been tough on North Korea, but lenient on Pakistan. There is evidence Pakistan provided North Korea with key nuclear technology, but it appears the administration has no plans to impose sanctions on Pakistan.<sup>105</sup>

Tied to nonproliferation is threat reduction. Threat reduction efforts have proven to be cost-effective. Thus far, the country's threat reduction efforts have focused exclusively on the former Soviet Union. The Soviet Nuclear Threat Reduction Act of 1991, championed through Congress by Senators Nunn and Lugar and renamed the Cooperative Threat Reduction Program in 1993, is designed to help the countries of the former Soviet Union destroy WMD materials and infrastructure.<sup>106</sup> The Nunn-Lugar program has destroyed 443 ballistic missiles, 427 ballistic missile launchers, 92 bombers, 483 long-range nuclear air-launched cruise missiles, 368 submarine ballistic missile launchers, 286 submarine launched ballistic missiles, 21 strategic missile submarines, 194 nuclear test tunnels, and 5,809 nuclear warheads. In addition, the Nunn-Lugar program facilitated the removal of all nuclear weapons from Ukraine, Kazakhstan, and Belarus.<sup>107</sup> Another encouraging step was taken in June 2002 at the G-8 summit. The G-8 agreement to the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction will devote up to \$20 billion over the next 10 years to reduce the proliferation threat of Russian WMD.<sup>108</sup> Because of the success of the Cooperative Threat Reduction program, Senator Lugar introduced a bill in March of 2002 that would have expanded Cooperative Threat Reduction to countries outside the former Soviet Union in order to resolve emerging

proliferation threats and to take advantage of opportunities to achieve nonproliferation goals.<sup>109</sup>

Although many policy analysts believed Cooperative Threat Reduction should be expanded, House Republicans blocked the bill in the National Defense Authorization Act for FY 2003 because the Cooperative Threat Reduction program was "originally envisioned as a short-term emergency effort."<sup>110</sup>

#### **SECTION FOUR: SHARED EARLY WARNING**

Shared Early Warning was another effort focused specifically on the threat from Russia. In his working papers, Dr. Bruce Blair believed the threat of an accidental or unauthorized launch from Russia could be reduced if both the United States and Russia spent more to upgrade their command and early warning networks and increased their resilience to attack.<sup>111</sup> One proposed plan to enhance Russia's early warning capabilities was the Joint Early Warning Center. In 2000, senior American and Russian officials signed an agreement to build a Joint Data Exchange Center near Moscow.<sup>112</sup> The genesis for the idea came from the Y2K Center for Strategic Stability in Colorado Springs. At the Y2K Center, each side successfully monitored launches during the millennium rollover. Similarly, at the Joint Data Exchange Center in Moscow, launch time, launch point, direction of launch, impact point, and impact time would flow in from the various sensors, and each side would show their data on computer-generated displays. Each side would then share their information.<sup>113</sup> The plan called for Russia and the United States to assign a total of sixteen military personnel to monitor the status of each other's missiles.<sup>114</sup> Planning for the Center continues; however, in FY 2003, Congress restricted funding due to a lack of agreement concerning taxes and liability.<sup>115</sup>

## **SECTION FIVE: COUNTERPROLIFERATION**

Where nonproliferation focuses primarily on the diplomatic, political, and economic means of controlling WMD, counterproliferation's focus is more military in nature with goals of preemption and retaliation with the application of military power to protect American assets and personnel. Counterproliferation strategies could work against covert attacks, but these efforts would require significantly greater investments in intelligence sensors, surveillance technologies, and enhanced border import and export control.<sup>116</sup> Besides the Department of Defense, the United States Customs Service would be a point of focus of any counterproliferation strategy designed to provide greater control over the extensive amount of personnel and material that enters and leaves the United States. The Customs Service processes over 550 ships, 45,000 trucks, 2,500 planes, 340,000 cars and 1.3 million people per day. Due to the huge volume, the Customs Service needs to find innovative ways to search for items hidden among the legal trade and to also find those individuals and companies in the United States who deal with terrorists.<sup>117</sup> The Customs Service is currently focusing its efforts on border control, disruption of terrorist financial networks, and monitoring strategic exports.<sup>118</sup> With a projection of over two trillion imports per year by 2006, the Customs Service faces a daunting challenge in controlling WMD material entering the United States.<sup>119</sup> In addition to improvements within the Customs Service itself, a counterproliferation strategy to control covert attacks against the United States may require structural realignment of federal security forces or the use of active duty military forces for border control.<sup>120</sup>

## **SECTION SIX:**

### **IDENTIFICATION AND PROTECTION OF CRITICAL INFORMATION SYSTEMS**

Although mitigating information system attacks may require completely non-military approaches, the impacts of an information system attack could be devastating to both the civilian and military sectors of society. Guarding against cyber attacks would require tighter standards for infrastructure protection, more secure systems, and strengthened laws against virus producers.<sup>121</sup> President George W. Bush has taken positive steps to improve capabilities to counter the cyber threat. In October 2001, President Bush issued Executive Order 13231, which created the President's Critical Infrastructure Protection Board to "recommend policies and coordinate programs for protecting information systems for critical infrastructure, including emergency preparedness communications, and the physical assets that support such systems."<sup>122</sup> Related to this initiative was increased funding for the National Infrastructure Protection Center (NIPC). This is a multi-agency center established to protect critical infrastructures and respond to attacks. The FBI hoped to add 138 new positions at the NIPC in FY 2003 to improve the NIPC's ability to build an intelligence base, analyze information, provide timely threat-related products, and identify and arrest individuals engaged in cyber crimes.<sup>123</sup>

## **CHAPTER FIVE: COST ESTIMATES AND COMPARISONS**

One can see from the discussion of threats in Chapter Three that the United States faces a variety of threats to its infrastructure, economy, and personnel. Plainly, the long-range ballistic missile threat is but one of many possible attack modes a hostile state or group could use against the United States. NMD is designed to counter only the ballistic missile threat, but it will do nothing to protect the United States against cruise missiles, suitcase bombs, cyber attack, or other forms of delivery of WMD.

To determine whether or not NMD is worth the cost, one must keep in mind that the price of missile technology favors the offense. Calculations in the mid-1960s suggested defensive systems were three times more costly than offensive systems.<sup>124</sup> Estimates today suggest the cost ratio is actually twelve to one in favor of offensive systems.<sup>125</sup> Obviously with the price ratio so biased against defensive missile systems, as the United States adds intercept boosters and enhanced warhead discrimination capabilities to its NMD system, it would cost an adversary much less comparatively to increase the number of missiles and warheads to the point of overcoming America's defenses.

To provide an evaluation of the expense of NMD, this chapter will first discuss the projected cost of NMD. Section Two will describe increased spending that resulted from the 11 September 2001 terrorist attacks. Section Three will briefly discuss expenditures for other programs to counter some of the threats previously discussed. Finally, the last section will consider the costs of other military priorities.

### **SECTION ONE: NMD COST ANALYSIS**

First of all, to make a worthwhile assessment of the cost of missile defense, it is helpful to compare annual missile defense expenditures with the defense budget as a whole, consider

how much has been spent to date, and review the estimates for the program in the future. For FY 2002, the Bush Administration requested \$343.5 billion for defense. The National Defense Authorization Act of 2002 provided \$343.3 billion, of which approximately \$8 billion was for missile defense.<sup>126</sup> The missile defense authorization equaled 2.3 percent of the defense budget.<sup>127</sup>

Currently research for missile defense systems is one of the largest weapons programs in the budget.<sup>128</sup> From 1962 to 2002, approximately \$143 billion had been spent on missile defense. Since President Reagan presented his 1983 "Star Wars" speech on missile defense, the United States spent \$91 billion on ballistic missile defense systems.<sup>129</sup> Of the \$91 billion, \$44 billion has been specifically for NMD.<sup>130</sup>

Developing an accurate estimate of the cost of NMD is extremely difficult. For instance, in a letter to Senator Thomas Daschle, the Congressional Budget Office stated the total costs of the type of the NMD system George W. Bush envisioned could not be accurately determined because some of the systems proposed were too early in their research to be able to provide a definitive estimate. Another variable complicating the estimate was that an adversary may employ countermeasures that would require significant design changes or upgrades, resulting in increased costs. Currently, the Bush Administration is exploring a wide range of systems that would intercept a missile in its boost, midcourse and terminal phases.<sup>131</sup>

In their response to Daschle, the Congressional Budget Office provided estimates in FY 2001 dollars for three versions of the ground-based midcourse system, a stand-alone sea-based midcourse system, and a space-based laser system. For the ground-based midcourse system, the Congressional Budget Office provided estimates for three versions of the system based on the number of sites and interceptors. The midcourse system is designed to destroy an

enemy missile in the midcourse of its flight after the rockets have stopped firing, but before its warheads reenter the atmosphere. The midcourse phase is the longest phase of flight and provides the longest amount of time to locate the target. One disadvantage of the midcourse system is that it has to locate a comparatively cool warhead against the cold background of space. Another drawback is that a midcourse system may also be defeated by enemy countermeasures such as balloons and decoy warheads. The midcourse system is the most advanced of all the proposed systems. The first estimate included 100 interceptors at one location and included an X-band radar, five upgraded early warning radars and a battle management command, control, and communications facility. For the estimate, the Congressional Budget Office assumed the system would be fully deployed by 2015 with a total cost between \$23 - \$25 billion and operating costs of \$600 million per year.

The second estimate was for an expanded capability that included a second interceptor site, additional radars, 250 interceptors, and improved software. The system described in the second estimate would defend against several tens of missiles employing countermeasures such as decoy warheads. Through 2015, this expanded capability system would cost between \$51 - \$58 billion with an annual operating cost of \$1.2 billion. Finally, the three-site system described in the estimate would include a total of 375 interceptors and would cost between \$56 - \$64 billion with an annual operating cost of \$1.4 billion.

A sea-based midcourse system may be an alternative to the ground-based midcourse system, but the Bush Administration believes a combination of systems could more effectively protect the United States. The Congressional Budget Office estimate for a stand-alone sea-based system consisted of either seven or nine destroyers, each carrying 35 interceptors. The sea-based midcourse system also included the ground-based radars deployed as part of the ground-based

midcourse system. According to the estimate, the cost to develop, deploy, and operate the stand-alone sea-based system would total between \$43 - \$55 billion. After 2015, operating cost would be about \$1 billion a year.<sup>132</sup>

There is widespread disagreement with the Congressional Budget Office's \$40 - \$50 billion estimate for a sea-based system. The conservative think tank, the Heritage Foundation, disagreed with the Congressional Budget Office's estimate for a sea-based system because the Foundation believed the United States could use assets already available. The Heritage Foundation believed a sea-based missile defense system could be deployed within three to four years at a cost of only \$2 - \$3 billion. This \$2 - \$3 billion would be enough to connect external sensors, including space-based sensors, to the Aegis command and control system. To defend against longer-range missiles like ICBMs, more modifications would be needed, including a new design for the Aegis' missile. With upgrades to the Aegis command and control system and missile, this sea-based system could defend very large areas. According to the Heritage Foundation, the sea-based system would use the Navy's \$50 billion fleet of 22 Aegis cruisers designed to defend against enemy aircraft and cruise missiles.<sup>133</sup>

The Ballistic Missile Defense Organization (renamed the Missile Defense Agency) stated that the Heritage Foundation's estimate was misleading. The Heritage Foundation estimate did not include the cost to use the Aegis cruisers, which the Navy would not give up without compensation. The estimate also assumed the use of but not the cost of the Space Based Infrared Satellite System-Low, projected to cost approximately \$10 billion. Finally, the plan to use the Aegis cruisers may not be technically feasible. Rear Admiral Rodney Rempt stated in Senate Armed Services Committee testimony that a faster interceptor would be needed to fulfill the NMD role. Engineering studies may be required to determine if an interceptor fast enough to

stop an ICBM may damage or sink the Aegis Cruiser when launched. In contrast to the Heritage Foundation's optimistic cost estimates for the sea-based midcourse system, the Missile Defense Agency projected the sea-based system would cost between \$16 - \$19 billion for 3-6 ships with an initial deployment date of FY 2011 at the earliest.<sup>134</sup>

Other than midcourse NMD systems, the Congressional Budget Office also provided an estimate for a space-based laser system. Space-based laser is a system designed to intercept a missile in its boost phase. The space-based laser would utilize a high-powered laser to heat and destroy the enemy missile in its relatively short period of powered flight. A boost-phase system has several advantages to the midcourse system. A boosting missile is easier to locate due to its bright infrared signature. The missile also moves slower during the boost phase than the warhead moves after separation from the missile. Also, attacking the missile instead of the warhead makes the use of countermeasures such as decoys useless to the adversary. Although there are many advantages when compared to a midcourse system, a problem with a boost-phase system is that the powered flight time of a missile is very short. To illustrate, a long-range missile is only in powered flight from three to five minutes. The short time period of the boost phase would require very fast interceptors and a rapid decision cycle. There is also the possibility the boost-phase system could damage the enemy missile without destroying it. If the warhead survived, it could still cause considerable damage. The Congressional Budget Office's estimate for the space-based laser assumed a constellation of 24 lasers and could cost between \$56 - \$68 billion. Once the system was fully deployed, annual operating cost would be around \$300 million; however, the operating cost did not include the cost to replace the lasers, which could cost between \$4 - \$5 billion per year starting in FY 2028.

Two other possible NMD systems for which the Congressional Budget Office did not provide estimates included the sea based boost-phase system and the Brilliant Pebbles space-based interceptor system. Conceptually, a sea-based boost-phase system would require a ship equipped with fast interceptors to patrol areas where a launch against the United States might be likely. If a launch was detected, the ship would launch an interceptor missile to destroy the enemy missile in powered flight. Although a sea-based boost-phase system may be technically feasible, its specific requirements have not been defined, and it is still conceptual; therefore, the Congressional Budget Office was unable to provide an estimate. Overall, the cost of a sea-based boost-phase system would depend on the number and location of countries the system would be designed to patrol and defeat. For an accurate estimate, more analysis would be needed on the type of interceptor missile required, number of ships needed, compliment of sensors necessary to rapidly pinpoint and target the enemy missile, and the battle management system required for decision-making within a short timeline.

The Congressional Budget Office also had no basis from which to provide an estimate for a space-based kinetic interceptor system similar to that envisioned by George H. W. Bush called Global Protection Against Limited Strikes or Brilliant Pebbles. Research for Brilliant Pebbles faltered during the Clinton Administration, but the current Bush Administration plans to revitalize research and development on space-based interceptors.<sup>135</sup>

Overall, President G. W. Bush's plan for a layered missile defense system capable of intercepting enemy missiles at various stages of flight could cost approximately \$238 billion by FY 2025. This estimate did not include money spent prior to FY 2002 and also did not include a sea-based, boost-phase intercept system or Theater High Altitude Area Defense (THAAD) and Patriot Advanced Capability-3 (PAC-3).<sup>136</sup> Both THAAD and PAC-3 use hit-to-kill missile

technology to intercept theater and tactical ballistic missiles.<sup>137</sup> Senators Tom Daschle, Carl Levin, and Kent Conrad voiced concern over the cost of NMD in a joint statement: “it [missile defense] could draw resources away from programs to counter other and more immediate threats that we know we face.”<sup>138</sup>

Table 4 provides a summary of the Congressional Budget Office’s cost estimates for the ground-based midcourse system, the stand-alone sea-based midcourse system, and the space-based laser system.

**Table 4: NMD Cost Analysis**

System Configuration	Possible IOC	Includes SBIRS-Low	CBO's Cost Estimate (In billions of constant 2001 dollars)	Range of Annual Costs (In billions of constant 2001 dollars)
<b>Ground Based Mid-Course</b>				
Single-Site with 100 Interceptors	2007	No	23 - 25	1 - 4
Two-Site with 250 Interceptors	2010	Yes	51 - 58	2 - 7
Three-Site with 375 Interceptors (a)	2012	Yes	56 - 64	2 - 8
<b>Stand-Alone Sea-Based Midcourse (b)</b>				
System Including Three Ships Patrolling Three Locations, Each Ship with 35 Missiles (c)	2010	Yes	43 - 55	2 - 7
<b>Space-Based Laser</b>				
System with 24 Satellites in Orbit	2018	No	56 - 68	1 - 7
<b>Total (d)</b>			122 - 187	

SOURCE: Congressional Budget Office.

NOTES: IOC = initial operational capability; SBIRS-Low = Space-Based Infrared System in low-earth orbit.

All ground-based midcourse and sea-based midcourse systems include one or more new X-band radars; upgrades of existing early-warning radars; and battle management, command, control, and communications centers.

a. Estimates for each ground-based system provide total costs, not incremental costs, and should not be added to one another.

b. The stand-alone sea-based midcourse system contains elements common to the ground-based systems. In addition, the patrol locations, velocity of the interceptors, and other key variables are based on its status as a stand-alone system. Therefore, the costs for it cannot be combined with those for a ground-based system.

c. The total number of ships needed to support three continuous patrol locations is seven or nine.

d. Low end includes only single-site ground-based midcourse system added to low-end of sea-based and space-based systems.

## **SECTION TWO: UNFORESEEN COSTS AS A RESULT OF 11 SEPTEMBER 2001 TERRORIST ATTACKS**

Unanticipated events happen, whether by attack or natural disaster, and when they do occur, the federal government invariably provides funding to assist in the recovery of the current problem and prevention of future events or attacks. Although 11 September 2001 was an extreme case, it is likely the United States will again see an unexpected event of the same magnitude or even worse. When spending tax dollars and deciding whether or not to increase deficit spending, the country's leadership should consider the costs associated with unexpected or unforeseen events that result in large appropriations for defense, homeland security, and repairs to infrastructure. In response to the terrorist attacks on 11 September 2001, three supplemental appropriation acts provided approximately \$65 billion in additional funding for FY 2001 and FY 2002. The increase in spending was also accompanied by a decrease in revenues. The Congressional Budget Office estimated the United States will suffer a loss of \$5 billion in revenue between FY 2001 and FY 2012 related directly to the terrorist attacks of 11 September. The \$5 billion does not include the unknown amount indirectly related to the attacks.<sup>139</sup> In addition, the military operations in Afghanistan cost approximately \$6.5 billion for the first 6 months. In a recent Congressional Budget Office analysis, the cost of military operations in Iraq may cost between \$9 - \$13 billion to deploy forces to the Persian Gulf, and the cost to actually fight the war may be between \$6 - \$9 billion a month.<sup>140</sup> Congress also passed the National Homeland Security and Combating Terrorism Act of 2002. This act established the National Office for Combating Terrorism in order to coordinate threat assessments and to develop and oversee America's strategy to combat terrorism and to coordinate the budget. The creation of this new department will cost approximately \$11 billion

between FY 2003 and FY 2007.<sup>141</sup> The military operations in Afghanistan, three supplemental appropriation acts, National Homeland Security and Combating Terrorism Act, and loss of revenue as a result the terrorist acts on 11 September were all unforeseen expenditures the United States government did not plan for prior to 11 September. Perhaps keeping the possibility of unforeseen events and their resulting costs in mind may help introduce restraint into the budgeting process.

### **SECTION THREE: COSTS OF NON-NMD EFFORTS TO COUNTER THREATS**

NMD is one system designed to counter one type of threat. This section will look at the expense of some of the other programs designed to counter the other threats and compare those costs to the current appropriation for NMD.

As was stated earlier, the United States Customs Service would be key to the control of materials imported or exported to and from the United States. In FY 2002, The Customs Service submitted a budget request of \$2.39 billion. In addition to this, Customs received an additional \$400 million in response to the 11 September terrorist attacks with an additional \$365 million planned for FY 2003. With this increase, Customs added inspectors and investigative agents.<sup>142</sup> Even with this increase, the entire Customs Service budget for FY 2002 was approximately 35 percent of what was appropriated for missile defense in FY 2002. In a comparison of the Customs Service budget for FY 2002 with the Department of Defense, the Customs Service budget was less than 1 percent of the defense budget; yet, the Customs Service is at the pointy end of the spear for preventing WMD from entering the United States.<sup>143</sup>

Similarly, the American Association of Port Authorities estimated the cost of adequate physical security at the nation's commercial seaports to be \$2 billion per year. About 1 percent

of missile defense's appropriation (\$92.3 million) was granted last year, but this amount was not allocated based on importance. The two busiest ports, Long Beach and Los Angeles, each requested \$70 million. Each received \$6 million of the \$92 million granted.<sup>144</sup>

In addition to the Customs Service, the FBI, as the lead federal investigative agency, would have a critical role in protecting the United States against WMD attacks. In their FY 2003 budget request, the FBI asked for an increase of 62 positions and approximately \$28 million (.35 of 1 percent of that appropriated to missile defense) to enhance the FBI's ability to respond quickly to crisis situations, especially those involving hazardous materials.<sup>145</sup>

As discussed earlier, threat reduction programs are another strategy to reduce the threat by eliminating and controlling WMD materials. To date, threat reduction efforts have focused on the former Soviet Union because that is where most of the WMD material outside the United States is located. From 1992 - 2002, the United States funded over \$4.9 billion in threat reduction assistance and nonproliferation to Russia. In FY 2002, security-related assistance to Russia was approximately \$870 million. In FY 2003, the request for threat reduction and nonproliferation programs in the former Soviet Union was a little over \$1 billion. The \$1 billion pays for protection, control, and accounting of nuclear material, plutonium disposition, arms elimination, chemical weapons destruction, and eliminates the production of weapons-grade plutonium.<sup>146</sup> The cost for the Nunn-Lugar threat reduction program equates to less than .2 of 1 percent of the United States annual defense budget; yet, this relatively inexpensive program has significantly enhanced the control of WMD and missile technology in the former Soviet Union.<sup>147</sup>

One approach to reduce the risk of an accidental or unauthorized launch from Russia is a Shared Early Warning Center in Moscow. Air Force Space Command's Budget Item

Justification Sheet, dated June 2001, estimated the cost for the Shared Early Warning Center to be \$11.1 million the first year tapering off to an operating cost of approximately \$3.5 million per year by FY 2004.<sup>148</sup>

One can see from a review of the costs of other programs designed to counter likely threats to the United States that there is not another program targeted at threats to the homeland that comes close to what the country spends on missile defense.

#### **SECTION FOUR: COMPARISON WITH OTHER MILITARY PRIORITIES**

Regardless of the funding for missile defense, it is unlikely the United States would be willing to give up its ability to project power and influence overseas. America's National Security Strategy states that the military must, "assure our allies and friends; dissuade future military competition; deter threats against United States interests, allies, and friends; and decisively defeat any adversary if deterrence fails."<sup>149</sup> Key to the country's ability to execute the National Security Strategy is a strong military, so expensive military programs will still be a priority. Keeping this in mind, how does missile defense compare with other defense programs? Only the cost of the Joint Strike Fighter (JSF) comes close to missile defense, but with legacy aircraft like the F-16, A-10, AV-8B and F/A-18C/D becoming too expensive to maintain and not capable of meeting warfighters' needs past 2010, the JSF is critical to the country's future warfighting capability.<sup>150</sup> In 1993, Les Aspin's Secretary of Defense Bottom-up Review recognized the services' need to affordably replace aging strike assets in order to maintain the country's technological edge.<sup>151</sup> The JSF program was the result of the 1993 Bottom-up Review. JSF will be the largest military procurement program in history and will cost between \$200 - \$400 billion. With that, the Department of Defense will obtain a total of 2,443 aircraft for the Air Force, Navy, and Marine Corps.<sup>152</sup>

The Air Force's number one acquisition priority, the F/A-22 Raptor is a \$69 billion program. With this, the Air Force will buy approximately 275 Raptors.<sup>153</sup> The Raptor will replace the F-15C as the top air-to-air fighter and will ensure air dominance for the next 30 years. Air dominance is critical for freedom of movement for ground, air, and naval forces. The Raptor combines the latest avionics and software and is nearly invisible to radar.<sup>154</sup>

The Navy carrier force structure includes twelve aircraft carriers. To maintain this, the Navy must begin construction on CVN-77 to replace the nearly 50 year old Kitty Hawk.<sup>155</sup> Naval presence is key to fulfilling the National Security Strategy because approximately 70 percent of the world's population live within 200 miles of the coast. The Navy and Marine Corps must have a credible expeditionary force engaged daily to influence and sustain security throughout the world.<sup>156</sup> The carrier force is crucial to meet this requirement. CVN-77 will provide a transition from the Nimitz Class carriers to the next generation carrier incorporating advanced technology.<sup>157</sup> The procurement costs for the Navy's aircraft carrier CVN-77 is approximately \$4.5 billion.<sup>158</sup>

Generally speaking, Deputy Secretary of Defense Paul Wolfowitz estimated that between 2002 and 2007, \$250 billion will be committed to major weapons programs, including \$46.4 billion for missile defense. The amount for missile defense up to 2007 is 18.6 percent of the total estimate for all the services' major weapons programs. An additional \$600 billion will be required after 2007 to complete the commitments to these programs, but missile defense is not included in the \$600 billion figure. According to Michelle Ciarrocca and William D. Hartung of the World Policy Institute, "there is a potential for a procurement train wreck coming up in five to ten years."<sup>159</sup>

Can the United States afford to cover the planned spending? If FY 2002 is any indication, the answer is no. In the first 11 months of FY 2002, the United States ran a budget deficit of \$202 billion.<sup>160</sup> Additionally, with G. W. Bush's tax cuts, the budget deficit is likely to grow substantially.

## **CHAPTER SIX: CONCLUSION**

Proliferation of WMD and ballistic missile technology is obviously a serious concern for the United States. The Rumsfeld Commission and the most recent National Intelligence Estimates agree that the United States will face ICBM threats from North Korea, Iran, and possibly Iraq by 2015. The ICBM threat also includes the traditional ICBM threats from Russia and China.<sup>161</sup> Additionally, it is now both policy and law for the United States to deploy NMD. Although long-range ballistic missile threats must be taken seriously, in a world of finite defense dollars, the leaders in the United States must ask if threats other than ballistic missiles are more likely, and if so, ensure taxpayer dollars are available to effectively counter more probable threats.

Currently the United States invests a disproportionate amount of money to counter the ballistic missile threat when most experts and intelligence estimates agree the ballistic missile threat is the least likely of all threats. If this trend continues, America may be safe from a ballistic missile launch from a rogue state, but it still will not be safe from offensive missile attacks from Russia and China. Russia already has an impressive nuclear arsenal, and China will in all likelihood develop enough offensive capability to overwhelm American missile defenses.<sup>162</sup> Additionally, history has shown that when a country or group is extremely well-defended in one area, the enemy will attack elsewhere. Given the historical record, expenditures for NMD should be carefully weighed against security and diplomatic programs to counter other threats. If the United States develops a formidable NMD system at the expense of tighter border security, intelligence collection efforts, offensive weapon systems, consequence management, and nonproliferation programs, then an enemy will choose to attack the United States with a suitcase bomb, cruise missile, or some other method of covert attack. In the end, Congressman

Richard Armey's grandchild will still not be safe from a foreign attack. In fact, complete protection from foreign attack is unrealistic and unattainable despite huge taxpayer investment.

To make the best use of limited tax dollars, instead of investing in an expensive, multi-layered NMD system, the United States should continue to focus military spending on offensive systems designed to deter a state or group from attacking the United States. Secondly, the United States should focus spending on effective consequence management. Additionally, the United States should continue to utilize nonproliferation strategies to negate the ballistic missile threat and also reduce the demand for WMD and long-range ballistic missiles. Finally, the country should focus its efforts on promoting responsible governance, improving regional instabilities, and rectifying double standards of current nonproliferation programs.<sup>163</sup>

An active counterproliferation strategy based on NMD is extremely expensive. Research and development of missile defenses is currently one of the most expensive weapons programs in the defense budget. This year, 2.3 percent of the defense budget is appropriated for missile defense research and development. Between 2002 and 2025, NMD may end up costing over \$238 billion. This large appropriation in the defense budget is designed to counter a threat the 2002 National Intelligence Estimate believed to be less likely than delivery of WMD by non-missile means.<sup>164</sup> Missile technology has historically been offensively dominated, so any NMD system will be in constant competition with increased enemy offensive systems and countermeasures.<sup>165</sup> The threat of a ballistic missile launch when weighed against the other threats to the United States does not warrant the cost of George W. Bush's plans for a layered, multi-system national missile defense. Large expenditures for NMD will ultimately degrade defense and security elsewhere. Considering the range of possible threats to the United States, America's missile defense systems should be theater-focused and limited in nature, but primarily

affordable when compared to other national priorities. The multi-layered system envisioned by the Bush Administration is not limited or affordable. Simply put, the threat from a ballistic missile launch does not warrant the cost of the missile defense plan envisioned by President George W. Bush.

The Battle of France in 1940 illustrates the dangers associated with placing too much emphasis and confidence on a defensive system. In 1940, France sought its security behind an impressive, expensive defensive wall designed to protect it from an attack from Germany. Not surprisingly, Germany attacked France where it was weakly defended and crushed the once formidable French army in six weeks. Is the United States building its own high-tech Maginot Line?

<sup>1</sup> Representative Dick Armey, "Remarks on H. R. 4, The National Missile Defense Act", *Freedom Works: Home Page of the Office of the House Majority Leader*, 18 March 1999, URL:

<<http://www.freedom.gov/library/defense/s990318.asp>>, accessed 13 November 2002.

<sup>2</sup> Robert D. Walpole, "North Korea's Taepo Dong Launch and Some Implications on the Ballistic Missile Threat to the United States," *Center for Strategic and International Studies CIA/DCI*, 8 December 1998 (hereafter cited as Walpole), URL: <[http://www.cia.gov/cia/public\\_affairs/speeches/archives/1998/walpole\\_speech\\_120898.html](http://www.cia.gov/cia/public_affairs/speeches/archives/1998/walpole_speech_120898.html)>, accessed 14 November 2002.

<sup>3</sup> Ivan Eland with Daniel Lee, "The Rogue State Doctrine and National Missile Defense," *Foreign Policy Briefing*, No. 65, 29 March 2001 (hereafter cited as Eland and Lee), URL: <<http://www.cato.org/pubs/fpb65.pdf>>, accessed 5 September 2002, 2.

<sup>4</sup> U. S. Congress, "H.R. 4 - National Missile Defense Act of 1999," *106<sup>th</sup> Cong.*, URL: <<http://www.cdi.org/hotspots/missiledefense/act.html>>, accessed 10 October 2002.

<sup>5</sup> Congressional Budget Office, "Estimated Costs and Technical Characteristics of Selected National Missile Defense Systems," *Letter to Honorable Thomas A. Daschle, U.S. Senate*, January 2002 (hereafter cited as CBO NMD Estimate), URL: <<http://www.cbo.gov/showdoc.cfm?index=3281&sequence=0>>, accessed 28 August 2002.

<sup>6</sup> Colonel Daniel Smith, USA (Ret.), "A Brief History of 'Missiles' and Ballistic Missile Defense," *Center for Defense Information*, URL: <<http://www.cdi.org/hotspots/issuebrief/ch2/>>, accessed 13 November 02.

<sup>7</sup> Michelle Ciarrrocca and William D. Hartung, "Axis of Influence: Behind the Bush Administration's Missile Defense Revival," *A World Policy Institute Report*, Arms Trade Resources Center, July 2002 (hereafter cited as Ciarrrocca and Hartung), URL: <<http://www.worldpolicy.org/projects/arms/reports/axisofinfluence.html>>, accessed 24 October 2002.

<sup>8</sup> Eland and Lee, 3.

<sup>9</sup> U. S. President, "The National Security Strategy of the United States of America," September 2002, (hereafter cited as NSS), 13-15.

<sup>10</sup> Eland and Lee, 2.

<sup>11</sup> U. S. Congress, *Executive Summary of the Report of the Commission to Assess the Ballistic Missile Threat to the United States*, Pursuant to Public Law 201, 104<sup>th</sup> Cong., 15 July 1998 (hereafter cited as Rumsfeld Commission Report), URL: <<http://www.fas.org/irp/threat/bm-threat.htm>>, accessed on 12 September 2002.

<sup>12</sup> Walpole.

<sup>13</sup> Central Intelligence Agency, *Foreign Missile Developments and the Ballistic Missile Threat Through 2015: Unclassified Summary of a National Intelligence Estimate*, December 2001 (hereafter cited as NIE 2002), URL: <[http://www.cia.gov/nic/pubs/other\\_products/Unclassifiedballisticmissilefinal.htm](http://www.cia.gov/nic/pubs/other_products/Unclassifiedballisticmissilefinal.htm)>, accessed 20 October 2002, 3.

<sup>14</sup> Thomas Moore, "The Cochran-Inouye National Missile Defense Act: An Historic Opportunity," Executive Memorandum #575, *The Heritage Foundation*, 1 March 1999, URL:

<<http://www.heritage.org/Research/MissileDefense/EM575.cfm>>, accessed 22 October 2002.

<sup>15</sup> U.S. Department of State, Bureau of Arms Control, "Fact Sheet: Missile Defense and Deterrence," (Washington D.C.), 1 September, 2001, URL: <<http://www.fas.org/spp/starwars/program/news01/nmddeterrence.htm>>, accessed 3 February 2003.

<sup>16</sup> Patrick Donley and Charles Krupnick, "The European Union and A Nuclear Security and Defense Policy," in *Nuclear Deterrence and Defense: Strategic Considerations*, ed. James M. Smith (Colorado: USAF Institute for National Security Studies, 2001), 144.

<sup>17</sup> U.S. Department of State, International Information Programs, "The Washington File," (Washington D.C.), 9 February 2001, URL: <<http://usinfo.state.gov/topical/pol/arms/stories/010209mr.htm>>, accessed 10 February 2003.

<sup>18</sup> Eland and Lee, 4-5.

<sup>19</sup> Robert G. Joseph, "The Role of Nuclear Weapons in US Deterrence Strategy," in *Deterrence in the 21<sup>st</sup> Century*, ed. Max G. Manwaring (London: Frank Cass, 2001), 54.

<sup>20</sup> Eland and Lee, 1.

<sup>21</sup> Eland and Lee, 3.

<sup>22</sup> NIE 2002, 9.

<sup>23</sup> Glenn Kessler, "U.S. Ties Oil Deal to N. Korea Nuclear Bid," *Washingtonpost.com*, 14 November 2002, URL: <<http://www.washingtonpost.com/wp-dyn/articles/A51194-2002Nov13.html>>, accessed 15 November 2002, A22.

<sup>24</sup> Eland and Lee, 7-8.

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<sup>25</sup> Joseph Cirincione, "A Much Less Explosive Trend," *Washingtonpost.com*, 10 March 2002 (hereafter cited as Cirincione), URL: <<http://www.washingtonpost.com/ac2/wp-dyn/A63933-2002Mar8?language>>, accessed 5 September 2002, B03.

<sup>26</sup> Eland and Lee, 9.

<sup>27</sup> Colonel Daniel Smith, USA (Ret.), "The Ballistic Missile Threat," *Center for Defense Information* (hereafter cited as Ballistic Missile Threat), URL: <<http://www.cdi.org/hotspots/issuebrief/ch3/>>, accessed 4 September 2002.

<sup>28</sup> Eland and Lee, 6-7.

<sup>29</sup> Ballistic Missile Threat.

<sup>30</sup> Rumsfeld Commission Report.

<sup>31</sup> Ambassador Karl F. Inderfurth, "Statement on Foreign Relations Hearing on the G-8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction," Senate Committee on Foreign Relations, Washington, DC, 15 October 2002 (hereafter cited as Inderfurth), URL:

<[http://justice.policy.net/proactive/newsroom/release.html?id=31807&PROACTIVE\\_ID=cecf9cfc9cbccccc5cecfccfc5cececfcccccfcfedcccd5cf](http://justice.policy.net/proactive/newsroom/release.html?id=31807&PROACTIVE_ID=cecf9cfc9cbccccc5cecfccfc5cececfcccccfcfedcccd5cf)>, accessed 3 November 2002.

<sup>32</sup> Bruce Blair, "Commission to Assess the Ballistic Missile Threat to the United States," *Appendix III: Unclassified Working Papers* (hereafter cited as Blair) URL: <[http://www.fas.org/irp/threat/missile/rumsfeld/pt2\\_blair.htm](http://www.fas.org/irp/threat/missile/rumsfeld/pt2_blair.htm)>, accessed 8 September 2002.

<sup>33</sup> Peter Baker, "Nuclear 'Milestone' Divides U.S., Russia. Failure to Construct Joint Warning Center Suggests Bigger Problems on Missile Defense," *Washington Post Foreign Service*, 13 June 2001 (hereafter cited as Baker), URL: <<http://backfromthebrink.org/newsroom/earlywarningwpv2.html>>, accessed 18 September 2002.

<sup>34</sup> Blair.

<sup>35</sup> NIE 2002, 7.

<sup>36</sup> Cirincione.

<sup>37</sup> F. G. Hoffman, "A Competitive Strategies Approach," *Center for Defense Information*, Washington, DC, March 2002 (hereafter cited as Hoffman), 12.

<sup>38</sup> NIE 2002, 8.

<sup>39</sup> Bates Gill and James Mulvenon, "China's Nuclear Agenda," *Op-Eds by RAND Staff*, (New York Times, 7 September 2001), URL: <<http://www.rand.org/hot/op-eds/090701NYT.html>>, accessed 6 November 2002.

<sup>40</sup> Loren B. Thompson, "Tracking China's Nuclear-Weapons Modernization Program," *Conference on China's Military Modernization Efforts*, (Washington DC, 11 March 1998) (hereafter cited as Thompson), URL: <[http://www.adti.net/html\\_files/china/LTCHINA.html](http://www.adti.net/html_files/china/LTCHINA.html)>, accessed 6 November 2002.

<sup>41</sup> Rumsfeld Commission Report.

<sup>42</sup> Federation of American Scientists, "DF-3A / CSS-2," *WMD Around the World*, 15 April 2000, URL: <<http://www.fas.org/nuke/guide/china/theater/df-3a.htm>>, accessed 8 December 2002.

<sup>43</sup> Shirley A. Kan, "China and Proliferation of Weapons of Mass Destruction: Policy Issues," *Congressional Research Service Report for Congress*, ORDER CODE RL 31555, 26 February 2003, URL: <<http://www.fas.org/spp/starwars/crs/RL31555.pdf>>, accessed 19 March 2003, Summary, CRS-7, 10, 14, 16.

<sup>44</sup> Rumsfeld Commission Report.

<sup>45</sup> Michael J. Finnegan, "Implications of Ballistic Missile Defense for the Security and Stability of Northeast Asia," in *Nuclear Deterrence and Defense: Strategic Considerations*, ed. James M. Smith (Colorado: USAF Institute for National Security Studies, 2001), (hereafter cited as Finnegan), 108.

<sup>46</sup> State Council, Peoples Republic of China, "White Paper--China's National Defense," *Information Office of the State Council*, 27 July 1998 (hereafter cited as White Paper), URL: <[http://tigger.uic.edu/~rodrigo/white\\_paper\\_98.htm](http://tigger.uic.edu/~rodrigo/white_paper_98.htm)>, accessed 6 November 2002.

<sup>47</sup> Rumsfeld Commission Report.

<sup>48</sup> Finnegan, 108-109,116. Ironically, the United States views unpredictability in other states as a factor in determining which states are rogues; therefore, keeping this in mind, one may be able to understand China's fear of an unpredictable America.

<sup>49</sup> Li Bin, "The impact of U.S. National Missile Defense on Chinese Nuclear Modernization," *Pugwash Newsletter*, 38 (1): June 2001, 59-68.

<sup>50</sup> White Paper.

<sup>51</sup> Walpole.

<sup>52</sup> White Paper.

<sup>53</sup> Thompson.

<sup>54</sup> Finnegan, 117.

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- <sup>55</sup> White Paper.
- <sup>56</sup> Finnegan, 116.
- <sup>57</sup> Hoffman, VIII.
- <sup>58</sup> Center for Nonproliferation Studies, “China’s Nuclear Doctrine,” *Nuclear Threat Initiative*, (Monterey Institute of International Studies) (hereafter cited as China’s Nuclear Doctrine), URL: <<http://cns.miis.edu/research/china/coxrep/doctrine.htm>>, accessed 6 November 2002.
- <sup>59</sup> Ballistic Missile Threat.
- <sup>60</sup> Gary Samore, “Proliferation Brief: The China Nuclear Controversy,” Carnegie Endowment for International Peace, Vol 2, No. 6, 24 March 1999, URL: <<http://www.ceip.org/programs/npp/brief26.htm>>, accessed 6 November 2002.
- <sup>61</sup> White Paper.
- <sup>62</sup> Finnegan, 120.
- <sup>63</sup> NIE 2002, 15.
- <sup>64</sup> Gary Hart and Warren B. Rudman et. al., “America-Still Unprepared, Still in Danger,” *Report of an Independent Task Force*, Council on Foreign Relations, (New York, NY, 6 December 2002) (hereafter cited as Hart and Rudman), 17-19.
- <sup>65</sup> Hoffman, VIII - IX.
- <sup>66</sup> Hart and Rudman, 22.
- <sup>67</sup> Christopher Bolkcom and Sharon Squassoni, “Cruise Missile Defense,” *CRS Report for Congress*, ORDER CODE RS 21252, 3 July 2002 (hereafter cited as CRS report on Cruise Missiles), URL: <<http://www.fas.org/spp/starwars/crs/RS21252.pdf>>, accessed 24 January 2003, CRS-4. According Bolkcom and Squassoni, a cruise missile is an unmanned aerial vehicle continually powered by an air-breathing or rocket engine. It is guided for the entire flight, weaponized, and optimized for a one-way mission.
- <sup>68</sup> Hoffman, 14.
- <sup>69</sup> NIE, 15.
- <sup>70</sup> CRS report on Cruise Missiles, CRS-1.
- <sup>71</sup> Hoffman, 13-16.
- <sup>72</sup> 2002 NIE, 15.
- <sup>73</sup> Centre for Defence and International Security Studies, *Devil’s Brew in Detail: Biological Weapons*, (hereafter cited as Biological Weapons), URL: <<http://www.cdiss.org/bw.htm>>, accessed 14 November 2002.
- <sup>74</sup> U. S. Army, “USAMRIID’s Medical Management of Biological Casualties Handbook,” 4<sup>th</sup> ed. *U. S. Army Medical Research Institute of Infectious Diseases*, (Fort Detrick, Maryland, February 2001), 4-5.
- <sup>75</sup> Hoffman, 20-21.
- <sup>76</sup> Biological Weapons.
- <sup>77</sup> Centre for Defence and International Security Studies, *Devil’s Brew in Detail: Chemical Weapons*, (hereafter cited as Chemical Weapons), URL: <<http://www.cdiss.org/cw.htm>>, accessed 14 November 2002.
- <sup>78</sup> Hoffman, 21.
- <sup>79</sup> Chemical Weapons.
- <sup>80</sup> Centre for Defence and International Security Studies, *Devil’s Brew in Detail: Radiological Weapons*, (hereafter cited as Radiological Weapons), URL: <<http://www.cdiss.org/rw.htm>>, accessed 14 November 2002.
- <sup>81</sup> Hoffman, 22.
- <sup>82</sup> Institute for Security Technology Studies, “Cyber Attacks during the War on Terrorism: A Predictive Analysis,” Dartmouth College, 22 September, 2001 (hereafter cited as Cyber Attacks) URL: <[http://www.ists.dartmouth.edu/ISTS/counterterrorism/cyber\\_attacks.htm](http://www.ists.dartmouth.edu/ISTS/counterterrorism/cyber_attacks.htm)>, accessed 15 December 2002, 18. According to the report, there are several different ways a hostile group or individual could attack critical systems. One could use a worm virus, distributed denial of service (DDoS), unauthorized intrusion, or domain name service (DNS) attacks. A worm virus occurs when the data buffer has more information put into it than the system can handle, resulting in system crashes or creation of a back door allowing unauthorized access. Newer worm programs may also contain a sleep phase by which the worm could infect many different systems prior to being activated. A DDoS attack compromises insecure servers by placing software on them that will launch an overwhelming number of requests on the attacked web sites. Unauthorized intrusions result in the compromise of sensitive information, and DNS attacks cause the user’s system to access the wrong web address, disseminating false information. With a DNS attack, the user may never know he or she is looking at a false address.
- <sup>83</sup> CERT Coordination Center, “CERT/CC Statistics 1988-2002,” *Carnegie Mellon University*, updated 21 January 2003, URL: <[www.cert.org/stats/cert\\_stats.html](http://www.cert.org/stats/cert_stats.html)>, accessed 13 March 2003.

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- <sup>85</sup> Barton Gellman, "The U.S. Finds Clues to Potential Cyber-attack Dams, Utilities, 911 System Called Vulnerable," The Mercury News, posted 27 June 2002 from the Washington Post, URL: <<http://www.siliconvalley.com/mld/siliconvalley/3554402.htm>>, accessed 14 March 2003
- <sup>86</sup> Hoffman, 25-26.
- <sup>87</sup> Robert G. Joseph and John F. Reichart, "Deterrence and Defense in a Nuclear, Biological, and Chemical Environment," *Center for Counterproliferation Research*, (Washington D.C: National Defense University Press, 1999) (hereafter cited as Joseph and Reichart), 28.
- <sup>88</sup> Robert H. Dorff and Joseph R. Cerami, "Deterrence and Competitive Strategies: A New Look at an Old Concept," in *Deterrence in the 21<sup>st</sup> Century*, ed. Max G. Manwaring (London: Frank Cass, 2001), 111.
- <sup>89</sup> Joseph and Reichart, 21.
- <sup>90</sup> Freedman, 740-741.
- <sup>91</sup> Ibid, 757-758.
- <sup>92</sup> Ibid, 21.
- <sup>93</sup> Gary L. Guertner, "Deterrence and Conventional Military Forces," in *Deterrence in the 21<sup>st</sup> Century*, ed. Max G. Manwaring (London: Frank Cass, 2001), 61.
- <sup>94</sup> Cirincione.
- <sup>95</sup> Blair.
- <sup>96</sup> Richard Danzig, "Countering Traumatic Attacks," in *Deterrence in the 21<sup>st</sup> Century*, ed. Max G. Manwaring (London: Frank Cass, 2001), 103.
- <sup>97</sup> Daniel S. Gressang IV, "Terrorism is the 21<sup>st</sup> Century: Reassessing the Emerging Threat," in *Deterrence in the 21<sup>st</sup> Century*, ed. Max G. Manwaring (London: Frank Cass, 2001), 72-73.
- <sup>98</sup> Hoffman, XI.
- <sup>99</sup> Hart and Rudman, 3.
- <sup>100</sup> Ibid, 14.
- <sup>101</sup> Ibid, 4.
- <sup>102</sup> Ibid, 10.
- <sup>103</sup> Ibid, 5.
- <sup>104</sup> F. G. Hoffman, "A Competitive Strategies Approach," *Center for Defense Information*, (Washington, DC, March 2002), 35.
- <sup>105</sup> Carol Giacomo, "Pakistan-N.Korea tie could become tricky issue for Bush," 14 November 2002, (Washington, DC: Reuters), URL: <[http://asia.reuters.com/news\\_article.jhtml?type=topnews&StoryID=1734899](http://asia.reuters.com/news_article.jhtml?type=topnews&StoryID=1734899)>, accessed 14 November 2002.
- <sup>106</sup> Defense Threat Reduction Agency, "Cooperative Threat Reduction," 9 April 2001, URL: <[http://www.dtra.mil/ctr/ctr\\_index.html](http://www.dtra.mil/ctr/ctr_index.html)>, accessed 13 November 2002.
- <sup>107</sup> U. S. Congress, Senate, "Authorization Of Use Of Cooperative Threat Reduction Funds For Projects And Activities Outside The Former Soviet Union," *Statements On Introduced Bills And Joint Resolutions S. 2026*, 107<sup>th</sup> Cong., 2d Session, 18 March 2002 (hereafter cited as CTR outside Soviet Union), URL: <[http://www.fas.org/irp/congress/2002\\_cr/s2026.html](http://www.fas.org/irp/congress/2002_cr/s2026.html)>, accessed on 17 February 2003, S2009-S2014.
- <sup>108</sup> Inderfurth. The G-8 consists of Canada, France, Germany, Italy, Japan, Russia, United Kingdom, United States.
- <sup>109</sup> CTR outside Soviet Union, S2009-S2014.
- <sup>110</sup> U.S. Congress, House, "H.R. 4546, Bob Stump National Defense Authorization Act of Fiscal Year 2003," 107<sup>th</sup> Cong., 2d. Sess., 16 May 2002, (hereafter cited as H.R. 4546), Sec 1307. And William Hoehn, "Update on Congressional Activity Affecting U.S.-Russian Cooperative Nonproliferation Programs," *Defense Authorizations, House of Representatives*, May 7, 2002, URL: <[http://www.ransac.org/new-web-site/whatsnew/050702\\_congress\\_upd.html](http://www.ransac.org/new-web-site/whatsnew/050702_congress_upd.html)>, Accessed 17 February, 2003 and
- <sup>111</sup> Blair.
- <sup>112</sup> Dan Verton and George I. Seffers, "U.S., Russia Launch Joint Missile-Warning Center," *Federal Computer Week*, 12 June 2000 (hereafter cited as Verton and Seffers), URL: <<http://www.fcw.com/fcw/articles/2000/0612/news-joint-06-12-00.asp>>, accessed 15 September 2002.
- <sup>113</sup> Susan Ellis, "U.S.-Russia Missile Accords to Strengthen Strategic Stability, (Early Warning, Data Exchange Accords Signed in Moscow)," *The Washington File*, 6 June 2000, URL: <<http://www.fas.org/nuke/control/jdec/news/000606-jdec-usia1.htm>>, accessed 14 November 2002.
- <sup>114</sup> Verton and Seffers.
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<sup>117</sup> Raymond W. Kelly, “Remarks to Vastera Annual User Conference,” 24 October, 2000 (hereafter cited as Kelly), (Reston, VA), URL: <<http://www.customs.gov/photo/message/spee1024.htm>>, accessed 17 October 2002.

<sup>118</sup> Robert C. Bonner, “Hearing on U.S. Customs FY03 Budget Request,” House Committee on Appropriations Subcommittee on Treasury, Postal Services and General Goverment, 27 February 2002 (hereafter cited as Bonner), (Washington, DC), URL: <<http://www.customs.gov/top/search.htm>>, accessed 17 October 2002.

<sup>119</sup> Kelly.

<sup>120</sup> Hoffman, 44.

<sup>121</sup> Ibid, 50.

<sup>122</sup> U.S. President, Executive Order 13231, “Critical Infrastructure Protection,” 16 October 2001, URL: <<http://www.whitehouse.gov/news/releases/2001/10/print/20011016-12.html>>, accessed 17 February 2003.

<sup>123</sup> Mueller.

<sup>124</sup> Lawrence Freedman, “The First Two Generations of Nuclear Strategists,” in *Makers of Modern Strategy from Machiavelli to the Nuclear Age*, ed. Peter Paret (New Jersey: Princeton University Press, 1986) (hereafter cited as Freedman), 757.

<sup>125</sup> Hoffman, 39.

<sup>126</sup> Amy Belasco and Stephen Daggett, “Appropriations and Authorization for FY2002: Defense,” *CRS Report for Congress*, ORDER CODE RL 31005, 2 February 2002 (hereafter cited as Appropriations for 02), 3, 45-46.

<sup>127</sup> Cirincione.

<sup>128</sup> Cirincione.

<sup>129</sup> Ciarrocca and Hartung.

<sup>130</sup> Christopher Hellman, “The Costs of Ballistic Missile Defense,” *Center for Defense Information* (hereafter cited as Hellman), URL: <<http://www.cdi.org/hotspots/issuebrief/ch5/index.html>>, accessed 18 September 2002.

<sup>131</sup> CBO NMD Estimate. Also according to Jack Spencer and Joe Dougherty, “The Quickest Way to Global Missile Defense: First from the Sea,” *World Policy Institute*, Backgrounder #1384, 13 July 2000 (hereafter cited as Spencer and Dougherty), URL: <<http://www.heritage.org/Research/MissileDefense/BG1384.cfm>>, accessed 13 November 2002, the boost, mid-course, and terminal phases of ballistic flight have different characteristics, requiring different approaches to counter each phase of flight. For instance, the first phase of flight, the boost phase, is the powered stage of flight that begins when the missile rises from its launcher and continues until it burns out. During this phase, the missile is most visible due to its high heat and infrared signature. Intercepting a missile during the boost phase destroys the missile and the warhead. Destruction during the boost phase occurs when the interceptor missile collides with the enemy missile prior to release of the warhead, eliminating concern over enemy countermeasures such as decoys and balloons. Once the powered phase ends, the missile is in its midcourse phase as it reaches space. This is the longest phase of flight and is also the phase when decoys would be released as countermeasures to a defensive system. In this phase, high-fidelity radars such as the X-band radar are needed to discriminate between the reentry vehicle and decoys. As the reentry vehicle leaves space and reenters the earth’s atmosphere, the mid-course phase ends, and the terminal phase begins. A terminal system defense is the least desirable because the interceptors must hit the reentry vehicle high enough to limit the destructiveness of the enemy’s payload.

For technical characteristics of the X-band radar, go to Federation of American Scientists, “Ground Based Radar (GBR) X-Band Radar (XBR),” *Space Policy Project*, URL: <<http://www.fas.org/spp/starwars/program/gbr.htm>>, accessed 9 March 2003. According to the Federation of American Scientists, the X-band radar would use a narrow beam directing most of the energy of the radar into the main beam, which allows for greater tracking accuracy. The radar is intended primarily for tracking and discrimination as opposed to surveillance. Upgraded Early Warning Radars currently used to survey for missile launches would locate the targets within a single beam, and the X-band radar would concentrate its power into this beam, allowing it to track targets at long ranges.

<sup>132</sup> CBO NMD Estimate.

<sup>133</sup> Spencer and Dougherty.

<sup>134</sup> Heritage Foundation, “Converting Navy Theater Wide TMD to an NMD System,” *Heritage Foundation Proposal*, 20 December 2001, URL: <[http://www.fas.org/ssp/bmd/guide/ntw\\_mid.htm](http://www.fas.org/ssp/bmd/guide/ntw_mid.htm)>, accessed 12 November 2002.

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<sup>137</sup> Lockheed Martin Space Systems, “Theater High Altitude Area Defense,” *Missile and Space Operations*, URL: <<http://lmms.external.lmco.com/defsys/thaad.html>>, accessed 12 November 2002. And Missile Defense Agency “Patriot Advanced Capability-3,” *Fact Sheet*, 3 March 2002, URL:

<<http://www.acq.osd.mil/bmdolink/pdf/pac3.pdf>>, accessed 12 November 2002.

<sup>138</sup> Hellman.

<sup>139</sup> Congressional Budget Office, “Federal Costs Associated with the Events of 11 September,” *Letter to Honorable John M. Spratt Jr., U.S. House of Representatives*, 29 August 2002 (hereafter cited as Costs of Sep 11), URL: <<http://www.cbo.gov>Showdoc.cfm?index=3748&sequence=0>>, accessed 3 October 2002.

<sup>140</sup> Congressional Budget Office, “Authorization for the Use of Military Force Against Iraq Resolution of 2002,” *Report transmitted to the Honorable Kent Conrad and the Honorable John M. Spratt Jr., U.S. House of Representatives*, H. J. Res. 114, 30 September 2002, URL:

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<sup>141</sup> Congressional Budget Office, “S.2452 National Homeland Security and Combating Terrorism Act of 2002,” *Cost Estimate*, ordered reported by the Senate Committee on Governmental Affairs on 25 July 2002, 14 August 2002, URL: <<http://www.cbo.gov>Showdoc.cfm?index=3722&sequence=0>>, accessed 2 October 2002.

<sup>142</sup> Bonner.

<sup>143</sup> Appropriations for 02, 45-46.

<sup>144</sup> Hart and Rudman, 17-18.

<sup>145</sup> Robert S. Mueller, III, Director, Federal Bureau of Investigation, “FY 2003 Budget Request,” Statement for the Record Before the House Committee on Appropriations Subcommittee for the Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies, 6 March 2002, (Washington, DC) (hereafter cited as Mueller), URL: <<http://www.fbi.gov/congress/congress02/03-06-02.htm>>, accessed 15 December 2002.

<sup>146</sup> The White House, “Fact Sheet: Threat Reduction Assistance, United States Government Nonproliferation/Threat Reduction Assistance to Russia,” 24 May 2002, URL:

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<sup>147</sup> Hoffman, 35.

<sup>148</sup> Air Force Space Command, *RDT&E Budget Item Justification Sheet (R-2 Exhibit)*, June 2001, (hereafter cited as RDT&E Budget) URL: <<http://www.dtic.mil/descriptivesum/Y2002/AirForce/0308699F.pdf>>, accessed 9 October 2002.

<sup>149</sup> NSS, 29.

<sup>150</sup> Joint Strike Fighter Program Office, *Joint Strike Fighter Program Briefing*, December 2002, URL: <[http://www.jsf.mil/Program/Briefings/JSF%20Program%20Brief%2012\\_02.pdf](http://www.jsf.mil/Program/Briefings/JSF%20Program%20Brief%2012_02.pdf)>, accessed 24 January 2002, slides 11-12.

<sup>151</sup> Les Aspin, U. S. Secretary of Defense, “Report on the Bottom up Review,” October 1993, URL: <<http://www.fas.org/man/docs/bur/>>, accessed 24 January 2003.

<sup>152</sup> Tony Capaccio, “Pentagon 2004 Budget Cites \$23 Billion in ‘Transformation’ Spending,” *Bloomberg.com*, 28 January 2003, accessed 24 January 2003, and Chuck Vinch, “Cohen: Joint Strike Fighter Program Must Stay on Schedule,” *Washington Bureau*, 24 June 2000 (hereafter cited as Vinch), URL: <<http://www.fas.org/man/dod-101/sys/ac/docs/man-ac-jsf-000624.htm>>, accessed 8 December 2002,

<sup>153</sup> Tony Capaccio, “Lockheed Must Cut F-22 Cost for U.S. to Buy More, Zakheim Says,” *Bloomberg.com*, 30 January 2003, accessed 30 January 2003.

<sup>154</sup> Air Force Link, *The F-22 Deters, Defends, Attacks*, URL: <<http://www.af.mil/lib/airpower>>, accessed 30 January 2003.

<sup>155</sup> Federation of American Scientists, “CVN-77 U.S. Navy Ships,” *Military Analysis Network* (hereafter cited as CVN-77), URL: <<http://www.fas.org/man/dod-101/sys/ship/CVN-77.htm>>, accessed 30 January 2003.

<sup>156</sup> U. S. Congress, Senate, “National Defense Authorization Act for Fiscal Year 2001 Report,” *Shipbuilding and Conversion Shipbuilding Overview*, 106<sup>th</sup> Cong., 2d Sess., 12 May 2000, S. Doc. 106 292, URL: <<http://www.fas.org/man/congress/2000/sr292.htm>>, accessed 24 January 2003.

<sup>157</sup> CVN 77.

<sup>158</sup> Ronald O’Rourke, “Navy CVN-77 and CVX Aircraft Carrier Programs: Background and Issues for Congress,” *Foreign Affairs and National Defense Division Summary*, Congressional Research Service, 19 June 1998, URL: <<http://www.fas.org/man/crs/98-359.txt>>, accessed 8 December 2002.

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<sup>160</sup> Congressional Budget Office, “Monthly Budget Review, FY2002,” *A Congressional Budget Office Analysis*, 10 September 2002, URL: <<http://www.cbo.gov/showdoc.cfm?index=3754&sequence=0>>, accessed 9 October 2002.

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<sup>163</sup> Ernie Regehr, “Missile Proliferation, Globalized Insecurity, and Demand-side Strategic Project,” *Ploughshares Briefing*, March 2001, 1-6.

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